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JOURNAL OF ELECTRICITY

VOL. 40 NO. 11 SAN FRANCISCO, JUNE 1, 1918 PER COPY, 25 CENTS

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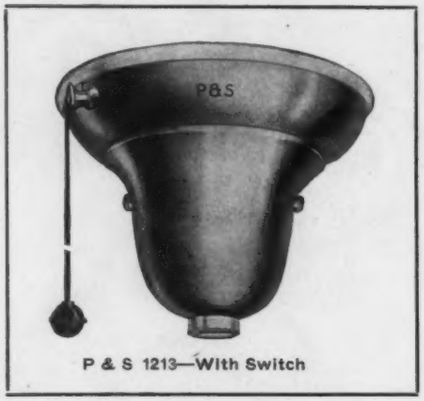

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JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor — CLOTILDE GRUNSKY, Associate

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HOW THE UPBUILDING OF THE WEST IS HELPING TO WIN THE WAR—XII

Out from the innermost recesses of the great heart of the West have poured its wealth in loving sacrifice to the Red Cross and the spirit of unselfish service it represents. There is something sublime in this expression of a liberty loving people that almost overcomes one in contemplating the wonderful spirit of the nation. Like the pent-up energies of the great water powers of the West, this on-rushing spirit seeks expression. Nor will it rest from its ceaseless activity until all nations and all peoples come to the realization of unity of life and brotherhood of man.

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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

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THE HOPE OF A NEW TOMORROW

There is considerable hue and cry in these strenuous days of international crisis as to what may be the outcome if governmental control of public utilities continue after the war. Some argue that while today the incentive of patriotic duty and the necessity for individual sacrifice are sufficient to hold the services of men capable of conducting these great businesses that on tomorrow, with the restoration of normal conditions, the opportunities for the exercise of personal initiative and ability will be so numerous that the best men will again turn their attention away from public service to personal profit. The questions are asked, "What is the use of economical management, what is the encouragement to improve the efficiency of apparatus or operating conditions, what is the spur to greater action, when personal initiative is smothered and private ambition is stifled?" And as a consequence the conclusion is drawn that great as are the dangers of uncontrolled profiteering, they are dwarfed into insignificance when compared with the possibility of the dead level of mediocrity. In view of these smothering, pessimistic statements, were it not for a renewed, revitalizing hope of a new tomorrow, the human race might well cease to struggle for a recognition of world-wide democracy and pass on into oblivion under the tyrannical sway of imperialism.

What, then, is this renewed, revitalizing hope for a new tomorrow? One thing is certain and that is that democracy's victory will not only be complete in the conduct of the affairs of nations but of corporations and groups of individuals as well, and that fair play and proper reward for service will be given. Another thing is certain, and that is that the splendid ideas of unselfish service inculcated in the throes of this terrible world war will not die with the conclusion of world peace, nor will men of broad, constructive vision seek service for private individual ambition under the regime of former days. The housecleaning and the purging of individual and corporation selfishness must not cease until the product becomes 100 per cent fine. When this is accomplished, those men and those corporations that are manifestly fair and aboveboard and offer constructive service to the nation will continue in their operation as of yore, but the former selfish type will not.

The hope of a new tomorrow is, then, that selfishness and greed, having in large measure passed from the human consciousness, the new tomorrow will see unselfish service emblazoned upon the banner of a constructive citizenship, and holding in mind this hope we may now at this time continue to meet the new issues that arise day by day in the best light of understanding given us, and leave these vexing problems of ultimate or partial ownership for solution when they come up to be solved.

In a word, the proper solution of today's problems and today's problems only, is the one safe basis upon which we may hope for wisdom and experience to handle those of tomorrow.

But with the lessons well learned from these days of trial, the dawn of a new tomorrow will certainly usher in a period of world development worthy of the sacrifice of today—a period of world development with its trying problems, too, for solution, yet with a broader humanitarian spirit fully capable of handling every new situation.

What Happened at Del Monte

Thoughtful men in looking back over the past semi-monthly period can not help but come to the forceful conclusion that never before in the history of the electrical industry in the West have events of such importance taken place as those which transpired at the recent joint convention of the California Association of Electrical Contractors and Dealers, the Pacific Division of the National Electrical Supply Jobbers Association, and the Pacific Coast Section, N. E. L. A.

Summarizing the several important events of the convention, briefly they may be detailed as follows:

For the first time in the history of the electrical industry three separate conventions representing different branches of the industry met under one roof.

The war service idea of these great conventions was carried through in magnificent detail. In the engineering discussions the possibility of increased economies was brought out, the seriousness of the fuel oil situation dwelt upon, while in the general sessions of the convention, the public policy committee recommended positive action to help alleviate the obstructions in the way of immediate new power development upon the public domain by recommending the insti-

tution of a publicity campaign that would enlighten the public of the dangers that threaten the industrial and agricultural activities of the nation in the immediate future if some action be not taken.

Early in the convention proceedings was held a women's war service session, conducted by women of the convention who very ably and convincingly brought out the new sphere of activities and duties that women must fulfill in the industry due to the exigencies of the war crisis.

Then there was the grand war service banquet on Friday evening. Few will ever forget that wonderful fifty-five minutes in which Professor Charles Mills Gayley, a speaker and writer of international note and Dean of the Faculties at the University of California, held his audience of four hundred eager listeners in his description of war service ideals in these trying times.

Then, too, in the commercial section meetings of all three of the conventions the spirit of a desire for closer, more helpful workable relationships between all branches of the industry was evident on all sides. This spirit, which has been developed to such a high degree in the West during the past year, reached its climax at the various sessions of the convention in the unanimity with which the "Goodwin Plan" was adopted in the various formal and informal sessions of the conventions.

But the one fact that stands out above all others is the protest that was evident on all sides against the closed meeting in all future discussions of every nature, kind and style that have to do with problems that affect the welfare of the electrical industry either as a whole or in its various branches of activity.

And finally, above all, was developed among the men and women who attended these conventions a closer understanding of the responsibilities of citizenship and of mutual helpfulness in public and private life at a time when the efficient maintenance of our industry means so much to civilization in this period of world crisis.

The Goodwin Plan and Electrical Organizations

It is interesting to note how the Wheatstone Bridge analogy applied by W. L. Goodwin to some of the ills of the electrical industry may be used to picture the proper balance in handling organization details of the various societies now of importance in the industry, and thus present a working basis so that overlapping of effort may be avoided.

On another page of this issue a picture is shown which sets forth in detail the Wheatstone Bridge analogy of Mr. Goodwin. In this view is exhibited how capital may be made to enter the industry from the public through the manufacturer, thence through the electric light and power company or the wholesaler, thence through the retailer to the consumer. If now these separate industries be replaced on the chart by the manufacturer's association, the national electric light association, the electrical supply jobbers association and the contractor-dealer's association, the Wheatstone Bridge again becomes a beautiful illustration for maintaining a balance. The capital entering the four organizations in the nature of dues from the members, who in this instance replace the public, as shown on the chart, is made to flow through all the four organizations with the result that statistics, data, and commercial efficiency are the outcome. Finally, stability and prosperity, indicated by the galvanometer, are brought about by an advisory committee, representative of all four organizations, which serves as a sensitive registering device for the noting of a want of balance.

A gigantic rally under the auspices of the California Electrical Co-operative Campaign is to be held in San Francisco on June 7, 1918, as announced elsewhere in this issue of the Journal of Electricity. The attendance of all men interested in affairs electrical is urged. Only by means of such meetings as this does further co-ordination of effort become possible. And in this co-ordination of effort due deference to the Wheatstone Bridge analogy will prove very helpful.

The Mobilization of the Electrical Industry

To properly mobilize the activities of an industry, it is well that the economic functioning of material forces be performed with the utmost degree of efficiency. When all is said and done, however, the proper utilization of human energy is the greatest of all necessities.

The electrical industry in the West, now so universally recognized as a leader in world thought along lines of mobilization of national forces, can do well to ponder further how even greater results may be accomplished. Until national laws are enacted that will see to it that idleness of any sort be prevented, much can be accomplished by voluntary action on the part of men and women in the industry to see to it that every man and woman be employed in some useful occupation.

Our progressive ally to the north has recently taken a most advanced step forward in this regard. In view of the fact that men of military age are a most pressing need to provide men for the allied forces in Europe, and also in view of the equally urgent need for labor to assist in the production of food and other articles essential for war purposes, an enactment has been put into effect that will be far reaching in its accomplishment for mobilization of national energy.

Under the new enactment now in force in Canada, every male person residing in the Dominion of Canada shall regularly be employed in some useful occupation, and if convicted of violation of the enactment is fined $100 or sentenced to imprisonment with hard labor for a period not exceeding six months in any common jail.

The exceptions to the law are interesting, and are:

(a) Under 16 years or over 60 years of age.

(b) A bona fide student proceeding with his training for some useful occupation.

(c) A bona fide student in actual attendance at some recognized educational institution.

(d) Usually employed in some useful occupation and temporarily unemployed owing to differences with his employer common to similar employees with the same employer.

(e) Physically unable to comply with the provisions of the law as herein enacted.

(f) Unable to obtain within reasonable distance any kind of employment which he is physically able to perform at current wages for similar employment.

There is much that each individual can do in helping to aid national efficiency and the mobilization of human effort for a common cause. The electrical industry is now recognized as an indispensable factor in helping to meet the present world crisis. Quiet thought on the part of each individual as to how each moment may be put to increased advantage combined with the synchronous helpful activity of all of our hundred million people, will net results that no human barrier can withstand. This careful watching of our time and to what use it is put is one of the ways that electrical men can forward the ultimate coming of world peace.

The War Finance Corporation

Recent information from the national capital relative to the war finance corporation is exceedingly interesting and timely.

The Federal reserve banks will continue to finance business and industry; the function of the War Finance Corporation is to finance the investment banking of the country. The functions of the banks and the corporation are complementary and full cooperation may be expected.

The War Finance Corporation will start business with a capital stock of $500,000,000, all subscribed by the United States Government, and will have authority to issue bonds to the extent of $3,000,000,000 with which to finance its operations.

The corporation will make loans to banks and trust companies making loans to finance "operations necessary or contributory to the prosecution of the war." These loans will be made for periods not exceeding five years and in sums not more than 75 per cent of the face value of the loans made by the borrowing banks to finance "operations necessary or contributory to the prosecution of the war." The notes of the borrowing banks taken by the corporation for these loans will be secured by adequate collateral.

The corporation may also make loans to savings banks and building and loan associations under certain circumstances, and may in some cases make loans direct to industries essential to the war.

Just as a large amount of the man power of the nation must be devoted to war purposes and a very great portion of the material and supplies of the nation must be devoted to the same purpose, just so a great deal of the money and the credit of the country must be derived from ordinary channels and devoted exclusively to purposes essential or contributory to winning the war.

Industries and business essential or contributory to war purposes must be afforded necessary financial assistance even if other ordinarily valuable industries are curtailed in their credit thereby. The War Finance Corporation is the government instrument for the conservation of the credit of the nation, conserving it for the purpose of winning the war.

In the West the attitude of the War Finance Corporation will be watched with keenest expectancy. In this vast section of the nation agriculture is in many instances entirely dependent upon hydro-electric power for irrigation. In one commonwealth of the West during the past year the agricultural production alone totaled a billion dollars. Then, too, ship building now proceeding by such rapid strides in Western sea ports is delicately interlinked with hydro-electric power supply. Fuel oil so necessary in steam electric generation is in a critical stage as it is estimated the surplus storage will be exhausted within a year. Added to this is the fact that there is a serious possibility of shortage in water supply due to light precipitation in the mountains in many sections of the West during the current season.

To properly handle the situation immediate and ample financial relief must be given to hydro-electric activity in the West by the War Finance Corporation.

The Customer Ownership Ideal

One of the most helpful factors in reaching the public ear and the securing of a sane and reasonable hearing of the pressing needs of the early solution of utility war problems, especially those relating to the necessity for the increase in rates, is the large amount of utility stock that is held by customers in many localities of the West.

An eminent Eastern authority along utility financial matters has recently stated that the ideal system of ownership is that where each customer has a proprietary interest in the utility in proportion to the service rendered him. The eventual mutual ownership of public utilities is the best from the standpoint of the customers and from every social and economic view.

There is still a vast opportunity of extending this mutual ownership idea in countless districts throughout the West. Such a movement, if carried to the possible limit, would greatly promote community and individual thrift and prevent public utilities from serving as a bone of contention in politics. There would then be no demand for ownership by the municipality and the problems of regulation would comprise only those of seeing that the charges for service were equitably distributed as between the different classes of customers.

While it is true that the tremendous drain upon the investing public makes the sale of utility stocks to customers of considerable difficulty at this period, still it is surprising to note the splendid results attained by several great utilities in the West during recent months.

In view of this recent success, the further extension of the customer ownership ideal is well worthy of further consideration.

THE NEW JOURNAL SERVICE: Due to the importance of the discussion that developed at the recent Del Monte conventions, more space has been allotted to this subject in this issue of the Journal of Electricity than originally contemplated. As a consequence, it has been thought best to postpone for a later issue the matter pertaining to summer uses of electricity which was announced for this number in the last issue of the Journal of Electricity.

The next issue of the Journal of Electrcity will feature commercial and engineering data relative to the development of China. This will be a new departure in technical journalism and should meet a present day need in the West, due to the gigantic increase in commercial and engineering relations of Pacific Coast ports of the United States with Far Eastern points.

INDUSTRIAL ILLUMINATION

BY F. H. MURPHY

(The importance of efficient industrial illumination can hardly be over-estimated in these days of stimulating production—and indeed many plants have revised their lighting systems during the past year purely as a war measure. A most valuable review of some of the most up-to-date industrial lighting installations in the vicinity of Portland, with a study of the principles involved, is here presented by the illuminating engineer of the Portland Railway, Light & Power Co.—The Editor.)

The present war has undoubtedly done a great deal to emphasize the importance of good illumination in industrial plants. In order to keep up with the enormous demand for products it has been necessary for many plants, which have heretofore been operated on only one shift, to increase to two and even three shifts per day. This has meant more light and better lighting than has been in use before in the majority of cases in order that the night shifts should not fall down in either speed or accuracy. That this condition may be realized it is necessary that the rooms be reasonably well lighted throughout, that an illumination intensity comparable to that of daylight be provided at all places where speed and accuracy are important, and finally that glare be eliminated.

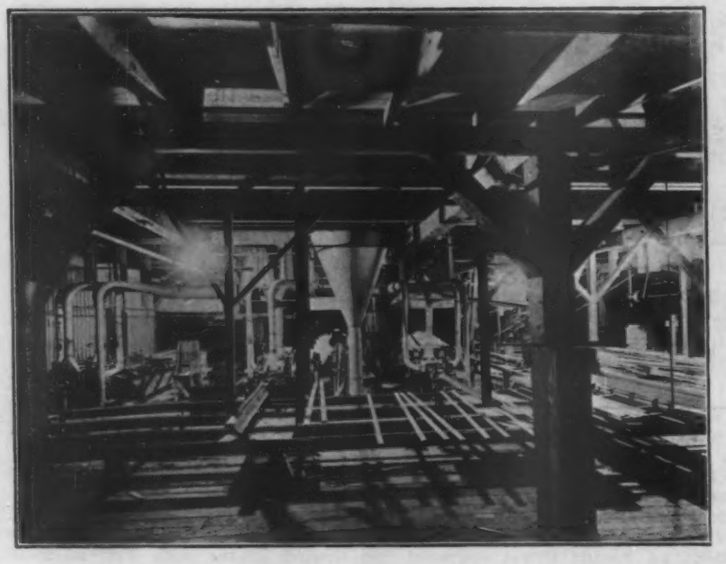
Unfortunately, in many cases, quantity has been mistaken for quality, with the resulting lack of efficiency. However, there is a growing realization of the fact that the problem of securing a proper system of illumination is one requiring the services of an expert, no less than does any other highly specialized work in connection with an organization.

Many of the more progressive organizations did appreciate the advantages of a correct lighting installation, even before the press of war demands was felt. The examples which are shown herewith are installations of this class. The cost of operation of these different installations is a relatively small item and they meet the requirements set forth in the opening paragraph as to what is necessary for a good lighting installation. The cuts are reproduced from untouched negatives taken in the various rooms between 9 and 10 p. m. The negatives were given a time exposure under the light of the installation itself.

In conclusion it is well to bear in mind that even with normal wage conditions a well-designed lighting system can be shown to pay for itself in the saving alone of the employees' time, to say nothing of the saving in spoiled material. How much more, then, would this be true in the case of present day wages.

The annual saving also of damages, due to avoidable accidents which can be prevented by adequate general illumination, will usually more than offset the annual energy and maintenance cost in addition to the first cost of installation.

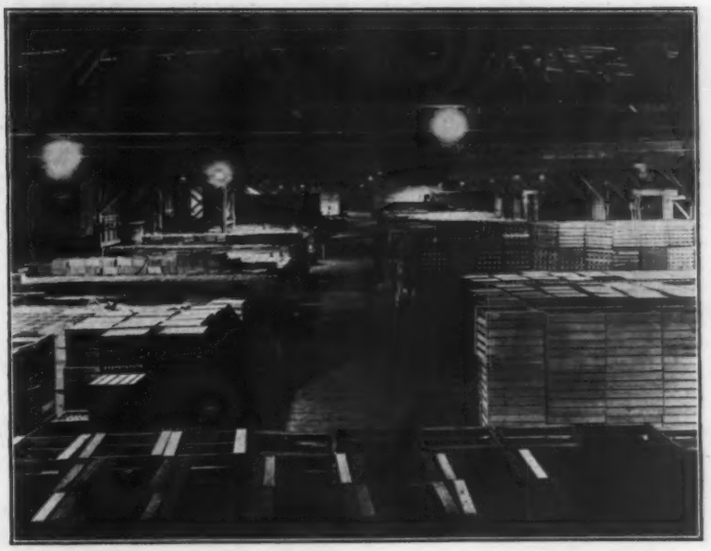
There is still another phase of the situation that is rarely given proper consideration and that relates to the physical and psychological effect upon the employee. Either a glaring installation or one with insufficient illumination will cause eye strain with all the attendant physical evils, in addition to spoilage, decreased speed and increased accident liability. Furthermore, these conditions breed irritability, discontent and lack of harmony, leading to a larger labor turnover, and even at times to possible strikes. These are not wild dreams or theories, but are actual facts which have been proven often and which must be faced whether believed in or not. Illumination is a phase of plant operation that insists upon intelligent treatment, otherwise it will exact its own revenge; and like nature herself the penalty is inexorably exacted regardless of political or commercial influence or belief.



A view in the planing section of one of our more progressive lumber mills. The wattage per square foot used in this location is approximately .33. The general illumination is accomplished by means of 400 watt Type "C" Mazda lamps installed in standard industrial units with enclosing globes and reflectors, placed approximately 33 feet apart.

A view in the trimmer section of the same mill. The wattage per square foot in this case is approximately .37. The illumination is secured by means of smaller lamps, varying from the 25 to the 60 watt size and installed in deep bowl porcelain enameled steel reflectors, some of which are clearly visible in the picture.

A view of the main sawmill, showing the log deck, carriage and saw. The intensity required here is greater than in the two previous locations and the wattage per square foot in this case is .53. The lighting units used are 100 watt Type "C" Mazda lamps in deep bowl porcelain enameled steel reflectors.



A section of the main floor of a large dock. The wattage per square foot in this space is approximately .16, yet it is clearly evident from the picture that it is possible to carry on all the work necessary in such a place as satisfactorily as in the daytime. 200 and 300 watt Type "C" Mazda lamps installed in deep bowl porcelain enameled steel reflectors mounted high above the floor are used in this case.

A section of the lower level of the same dock in which the wattage per square foot is approximately .16. In this case the installation consists of 100 watt Mazda lamps installed in deep bowl porcelain enameled steel reflectors mounted on the ceiling of the dock.

A view in one of the large warehouses connected with the docks previously referred to. The wattage per square foot used in this warehouse is .12 and the installation consists of 250 watt Mazda lamps installed in deep bowl porcelain enameled steel reflectors mounted approximately 20 feet above the floor. This installation was made before the advent of the Type "C" lamps and the 250 watt lamps will undoubtedly be replaced eventually by 200 watt Type "C" lamps. As may be readily seen from the cut, it is possible to transact all warehouse business without any delay caused by lack of light in any portion of the room. This is accomplished by means of an expenditure of energy of only .12 watts per square foot, an item which is entirely negligible when considering the advantage obtained from it.

A view in the loom room of a large woolen mill. This room is provided with both general and special illumination. The general illumination is accomplished by means of 100 watt Mazda lamps installed in deep bowl distributing X-Ray reflectors, mounted approximately 13 feet 6 inches above the floor and using approximately .2 of a watt per square foot. 40 watt Mazda lamps installed in deep bowl porcelain enameled steel reflectors of the concentrating type are used for providing the special lighting for the looms. The looms are all arranged in pairs facing each other, the special illumination is so arranged that two lights are provided over the front of each loom and one unit is used to light the passage way between the backs of two adjacent looms. This installation has been in use for some time and is giving entire satisfaction. The glare spot on the right of the picture is produced by means of a bare lamp which for some unknown reason has been hung in that location and which was overlooked by the photographer.

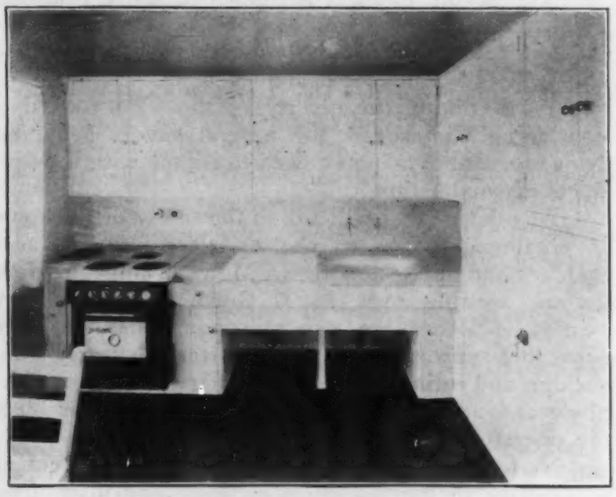
ELECTRIC COOKING AND ELECTRIC RANGES

BY H. C. HOPKINS

(It is a significant fact that in spite of the war, with its attendant rise in prices, and the fact that power companies as a whole have not pushed their domestic business, electric range sales have steadily increased throughout the country. This means larger electricity bills and a chance to make the domestic load provide a reasonable profit. The situation in this field is here interestingly analyzed by a man who is industrial engineer with the sales department of the Westinghouse Electric & Manufacturing Co., San Francisco office. The paper is one which was given recently before the Nevada Section of the N. E. L. A. at Reno, Nevada.—The Editor.)

The subjects of electric cooking and the development of the electric range business has received such an abundance of publicity during the past two years, that it becomes a difficult matter to offer any original thought or ideas on this subject. Most of the information contained in this paper is therefore of necessity a repetition of information previously published.

At this particular time, when our country is in a fever of war preparation, and the usual fuels, such as coal, oil and gas, are required in the industries in a larger measure than ever before, the necessity of utilizing electricity for home fuel requirements becomes almost a patriotic duty. To reduce the consumption of coal and oil in the homes, substituting therefor electricity, means a vast conservation of fuel and in addition relieves greatly our already overburdened transportation systems. At the existing price of coal and oil, the increased use of electric ranges will also mean a direct saving in household expenditure, thus relieving economic pressure occasioned by the continued rise in the cost of living.



AN ELECTRIC RANGE IN A RENTED APARTMENT

The convenience and safety of the electric range is a greater argument than money economy—and just as it pays for this owner to make his flat inviting by electricity, so it pays the householder to bring comfort to his own home.

The high prices of coal, gasoline and kerosene makes the present a most opportune time for the development of the electric cooking business, as in a great many cases, electric cooking is accomplished at less cost than with the fuel mentioned, without considering the many advantages obtained by the use of electricity for cooking.

The central station is of course interested in the development of this or any other business, primarily for the monetary benefit to be derived. However, there are other benefits which should be given serious consideration, which cannot always be stated in terms of money.

Statistics compiled by various central station sales managers show that at the present time the average cost of installing an electric range is approximately $79. The average current consumption is approximately 1111 kilowatt hours per year. The average revenue per year is $42. The figures cited are by one concern only. The installation cost, however, is fairly uniform at the price mentioned. The revenue per year per range will vary considerably, ranging from $35 to $48 per year, depending upon the price obtained for current. In the case cited above, the revenue per year is actually 53 per cent of the installation charge.

Statistics on Electric Range Installation

Ranges Installed	Average No. of Persons in the Family	Average Active Kw.	Average Kwh. per Year	Average Revenue per Year	Average Kw. per Month	Average Revenue per Month
69	3.4	3.6	1111	42.28	93	3.52

Average Cost of Inside Wiring	Average Cost of Service	Average Cost of Trans. and Meter	Total Average Cost of Installation	Average Rate per Kwh.
20.13	17.83	40.95	78.91	3.8

Idaho Power Co.—Month of February, 1917

No. Ranges Installed	Total Net Revenue	Lowest Net Revenue	Highest Net Revenue	Average Net Revenue
146	379.60	.90	7.25	2.60

85 per cent of all bills were under $3.88

It has been proven that the electric range load is purely a day load.

Instead of a lighting customer whose bill is usually so small that it hardly pays for the cost of bookkeeping, the customer, using electric cooking, increases the size of his monthly bill at least three times.

The cooking load is particularly valuable to the small central stations or central stations operating in small towns, as it is a day load and makes 24 hour service profitable, particularly where power service is limited. Any development which will bind the customer more firmly to the central station company is unquestionably a valuable asset.

The development of electric cooking during the past two years has been very rapid. New methods of

construction, the use of the best quality of materials available, and high grade workmanship has resulted in the development of a line of ranges which are conceded to be satisfactory in every respect. This is conclusively demonstrated by the fact that there are at the present time over 15,000 ranges in use in the United States. In spite of the continued increase in the selling price of ranges, and in spite of the numerous obstacles which the central stations have had to encounter during the past year, the demand for electric ranges appears to be as great as ever.

The tendency to reduce active solicitation of range business by the central stations, naturally led to a flattening of demand in some localities, but on the other hand, the result of the past two years' educational work is being felt, and in localities where electric ranges are already in use, new customers are demanding service.

It is of course desirable for a central station contemplating development of the range business to standardize on one or two makes of ranges. A suitable stock of repair parts should also be carried, so as to insure the customer the very best possible service in case of trouble.

Standardizing on one or two makes of ranges, reduces the investment in repair part stock to the minimum. Furthermore, salesmen and trouble men quickly become expert when only a few types of ranges are handled, whereas if every type of range on the market is purchased indiscriminately, these men cannot be expected to absorb all the details of construction and operation of every make.

The ranges offered for sale by the leading manufacturers today can all be classified as reliable and satisfactory. Some, of course, have distinctive features, which do not appear in others. However, it is generally understood that a satisfactory and efficient range should embody the following features:

The body and frame should be strong and built to stand hard usage.

The ovens should be well lagged to reduce radiation losses to the minimum.

The heating unit should be made of the very best resistance material available.

The switch control should be as simple as possible, and should be plainly marked.

All ovens should be equipped with reliable temperature indicating devices.

The finish should be pleasing, durable and inexpensive.

The above are the main features which are indispensable. Each range manufacturer naturally advocates other features which are distinctive of his particular product.

Any sales campaign or sales effort calculated to promote the use of electric ranges must of necessity be of an educational nature. It is almost impossible to sell electric ranges unless the idea of electric cooking with its numerous advantages is first proved to the prospect. Unless the advantages of electric cooking are thoroughly understood and appreciated by the customer, the inevitable result is that the user makes a comparison of the cost of operation with the fuel previously used for cooking.

The result of such a comparison is not always favorable to the electric range, particularly where the cost of electricity is higher than 3 cents per kilowatt hour. The customer would not think of comparing the cost of his electric light with the cost of gas or oil lamps, simply because he thoroughly understands and appreciates that he is obtaining better light and better convenience than he formerly enjoyed, and this represents to him a definite value in convenience and comfort.

The advantages and benefits to be derived from the use of electric ranges are numerous. The electric range is sanitary and clean. The products of combustion—ashes, soot, or fumes, are entirely eliminated, making it easier to keep the kitchen clean, sanitary and more cheerful, with a resultant saving in labor and cost of refinishing the walls and housecleaning.

Practically all of the heat generated is used for cooking; consequently, the temperature of the kitchen is not raised.

Cooking can be performed with mathematical precision, eliminating guesswork entirely. This is due to the perfect control and easy regulation of temperature. The time ordinarily spent in preparing and watching the food cooking in a coal or gas range is very considerable, and can be saved and used to better advantage when this modern heating agent is utilized.

The saving in meat shrinkage is quite considerable, ranging from 5 to 15 per cent. This is an important feature, particularly in these days of food shortage and high cost of living.

Furthermore, the quality of the food cooked is considerably improved, the natural flavors being retained instead of being allowed to escape with the products of combustion.

Any device that will add to the safety of the home is commendable. The use of electricity displaces matches and open-flame fires. Matches alone are dangerous, causing over $3500 worth of fire damage yearly. Matches are also poisonous, and statistics show that approximately 1000 children die yearly from sucking and eating match tips. There is no gas to explode and no flame or flare up to start fires or burn the operator.

No business man would think for one moment of going back to the old office methods and discarding the use of such modern labor-saving devices as typewriters, billing machines or adding machines. These devices are considered necessary to the proper and efficient management of one's business. The use of electricity in the home is simply a modern labor-saving instrumentality, saving money, labor, time and worry, and therefore should be considered as part of the modern housekeeper's equipment.

The points brought up and others which are readily available should be thoroughly understood by the range user or prospective user. In other words, if the central station can create the desire in the mind of the prospect for this modern service with all its efficiencies and advantages, it will not be necessary for the central station solicitor to actually sell the range; the prospect will take care of that part of the transaction by actually buying the range.

To properly promote the use of electric ranges, the central station employees should be induced to install electric ranges, so as to obtain first hand information of the actual cost of electric cooking and the advantages to be derived.

An employee who is an enthusiast will naturally talk ranges to his friends, and acquaintances, and will be able to locate prospects during his daily work and when he comes in contact with the central station's lighting customers.

Electric ranges should be publicly demonstrated on every possible occasion, and all prospects secured from such public demonstrations should be actively followed up by competent salesmen.

Literature should be mailed such prospects from time to time. Leaflets showing the actual cost of operation of electric ranges, installed in the prospect's neighborhood, have been found very effective.

Such leaflets should show, in addition to the cost of operation for several months, the name and address of the customer owning such range. This will do more to eliminate the belief that electric cooking is expensive than any other plan.

The domestic science school furnishes a very good medium for educational work, and special effort should be made to install electric equipments in the domestic science department of all high schools. Experience has shown that girls who have been trained to the use of the electric range will talk electric cooking in their homes, and are in many cases instrumental in getting their families to purchase electric ranges.

All such sales and educational activities should of course be backed up by sound and sensible advertising in the newspapers, or by any other means which are suited to the particular locality.

It is such educational work that has placed approximately 15,000 electric ranges in American homes, and that has developed a definite market and demand for electric cooking. The so-called Whirlwind Campaign plan has not been found applicable to the development of this business, but on the other hand, has been found extremely unprofitable and expensive.

PRIMER OF INDUCTIVE INTERFERENCE

BY D. I. CONE

(The principles of inductive interference which are at the base of one of the most important problems now under discussion by electrical men, themselves involve only simple electrical phenomena. This clear and concise explanation has been prepared for readers of the Journal of Electricity by a man who was prominent in the investigations recently carried on by the California Joint Committee on Inductive Interference.—The Editor.)

The flow of electricity (electric current) when the voltage or potential difference to earth of a conductor is varied, was considered in the preceding discussion, and it was shown that electric currents are set up in neighboring circuits, proportional to the voltage of the disturbing circuit. This action is termed electrostatic or electric induction. The induced current has the same frequency as the voltage of the disturbing circuit. Thus, suppose a trolley wire to have a "direct" potential of 600 volts to earth plus a high-frequency component due to the slots in the generator armature of 3 volts effective value at 1500 cycles per second. After the transient of starting has subsided, there will be no induced current in a neighboring wire due to the 600 volt direct potential, because it does not vary and hence causes no variation of the amount of electric charge. But the 1500 cycle slot-harmonic voltage causes a current of 1500 cycles frequency in the neighboring circuit.

The action of the electric charges, already described, is that which takes place in an electric condenser as commonly used in telephones, induction coils and radio sets. That is, a wire and earth, or two wires, act like the plates of a condenser. The "capacity" (more correctly, capacitance) is very small. For example, a 4/0 wire 25 feet above earth has capacitance to earth of 0.01 microfarads per mile, while

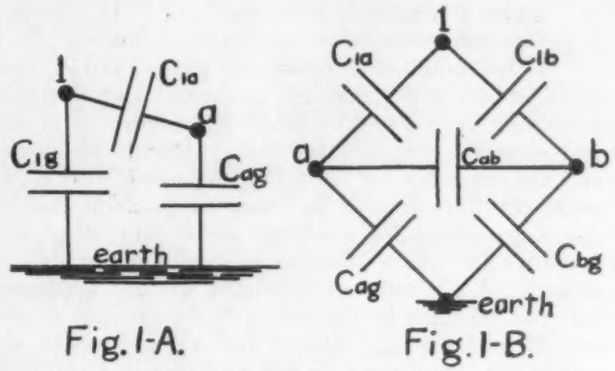


Fig. 1-A. Fig. 1-B.

Equivalent condensers to represent electric induction

the condenser in a telephone set, composed of paper and lead-foil, has a capacitance of one microfarad (one hundred times as great) in a space about 2x4x1 cubic inches.

To study electric induction it is very convenient to replace the actual wires by equivalent condensers. In the simple case of a disturbing wire "1," a disturbed wire "a" and earth (always assumed at zero potential) we can imitate the actual exposure by three condensers as shown in Fig. 1A. If wire 1 has a potential E, at a given instant, the potential of wire a is $E_a = E_1 \times C_{1a}/C_{1a} + C_{ag}$ if wire a is isolated within the exposure. E_a is thus not dependent on the length of the exposure. But in ordinary operation a is connected to unexposed wire and apparatus. These reduce the voltage of a to ground by providing a path for current through the connected line and apparatus. Knowing E_a and the impedances in the circuit, the amount of this disturbing current can be determined.

Fig. 1B shows the case of a disturbing wire 1 and a two-wire disturbed circuit a, b. It has been drawn like the usual figure of a Wheatstone bridge to better illustrate the effect of transposing a and b, and also to show the importance of equal or "balanced" relations to earth of a and b.

Insulation resistance, unexposed line and terminal apparatus of circuit a, b could be represented by impedances in multiple with condensers C_{ab}, C_{ag} and C_{bg}. By properly transposing a and b we can make $C_{1a} = C_{1b}$. Then if $C_{ag} = C_{bg}$ we have the equivalent of a balanced Wheatstone bridge, with no difference of potential and no current from a to b, hence no disturbing current in circuit a, b. But any unbalance in the impedence of a and b to earth destroys the balance of the "bridge" and causes current in circuit a, b. Hence the very great importance of balancing communication circuits to earth, as well as to the disturbing circuit. The effect of decreasing E, or of increasing the separation of the disturbing and disturbed circuits is to make E_a and E_b less, hence reducing the disturbing current.

PACIFIC COAST ENGINEERING PROBLEMS

(The discussion at the recent Del Monte conventions brought out much that is valuable in solving electrical problems of the West in the present crisis. The report of the first day's session was begun in the last issue of the Journal of Electricity and is continued here, together with discussion as brought out in the remaining sessions of the Engineering Section.—The Editor.)

POSSIBLE WATER POWER DEVELOPMENT IN CALIFORNIA

Edward Whaley in a discussion of F. H. Fowler's paper on this subject, contributed the following:

There is undoubtedly existing today a critical condition in the power markets of Central and Northern California, aggravated by subnormal conditions of rain and snowfall, a rapidly increasing demand for power and the necessity for curtailing the use of fuel oil in order that this form of fuel may be available in adequate quantities for maritime needs and other war activities for which no other source of power can be substituted. It must be admitted without argument that fuel oil must be conserved to the greatest extent possible and that agricultural and war production demands for power must be met and that in California, at least, this can be done by the substitution of power generated by falling waters.

In Mr. Fowler's able exposition of the subject he has shown, and in fact it is and has been a matter of common knowledge, that the possibilities of hydroelectric development in this state are ample to meet all demands that may be expected for many years to come; but we are now faced with a situation of national importance in which two factors are of primary importance, viz: the delivery into the market of a large block of power and the delivery of this power in the shortest time possible. Any discussion of the problem which does not realize these two factors as absolutely controlling in the present emergency is purely academic.

As between two or more developments of sufficient magnitude, that development should be made which can be placed in operation within the shortest time.

The next point for consideration is the number of man power days necessary for completion and the season when same will be required. This is of particular interest both as to the total amount of labor to be drawn from an already insufficient supply and also as to the ability to prosecute all or a considerable part of the work under favorable conditions throughout the winter months, when the call for labor for planting and harvesting is non-existent.

The final point for consideration is the amount of money which must necessarily be diverted from other purposes to furnish the necessary amount of power to fully meet the present emergency. From all present indications the war promises to be of such a duration that the financial resources of the country will be strained to the utmost before a victorious conclusion is reached and it is only sane procedure to accomplish all necessary results with the minimum of expenditure now, when the burden seems comparatively light.

In the report of the committee representing electric utilities appointed by the Railroad Commission to investigate power conditions and possibilities for Northern California, and also in the report prepared for the commission by its own engineers, it appears that a development of 100,000 horsepower at the present time in a plant capable of producing this amount continuously throughout the year as a base load will meet present requirements.

Mr. Fowler, in his paper, pointed out that there were at least three possible developments in Northern California that would produce this amount of power, namely, the combined project of the Great Western North Fork of the Feather River and Yellow Creek project of the Pacific Gas & Electric Co., the Pacific Gas & Electric Pit River project and the Northern California Power Company's Pit River project.

The development of the Pacific Gas & Electric Pit River project cannot meet the present emergency as the estimated time to complete is five years. The Feather River project has been estimated to take two and one-half years and the Pit River project of the N. C. P. Co., Cons., to take 18 months. In point of time, therefore, the latter project is in a class by itself. The entire flow line is only five and one-fourth miles long, of which approximately 10,000 feet is tunnel, divided into five sections, the longest of which is only 3450 feet in length. From this it at once becomes apparent why this project can be developed so much sooner than the Feather River project, where fourteen miles of tunnel will have to be driven.

The pipe lines are only 800 feet long, so that the demands on the steel plate mills, already overloaded and behind on deliveries to our shipbuilding plants, will be a minimum and much less than for any other development projected.

The amount of tunnels will permit the prosecution of a large proportion of the work when labor will be most available and the open ditch section is of such dimensions and the formation of such character that power driven machinery will be used largely to the exclusion of manual labor.

In point of total cost, this project will call for by far the least money, and will cost far less per unit of output than any other possible development and this low unit cost will be a low immediate cost and not one to be attained some time in the far distant future after many millions of dollars have been spent on other power plants to be finally operated as part of the one comprehensive scheme.

Mr. Fowler stated as his personal view that he favored the project of the Pacific Gas & Electric Company as against that of the Northern California Power Company, Consolidated. I infer that this preference arises out of the fact that the Northern project excludes some portions of the fall of the Pit River which are included in the Pacific Gas & Electric project, and that he is fearful that for this reason the utmost ultimate development will not be made of the latent possibilities of this stream. This is the viewpoint of the extreme conservationist, but in this case there can be no room for controversy on this point as the

topography of the country makes it perfectly feasible to include these sections of the river in other developments which will undoubtedly be made in later years.

The water resources report of 1912 shows the potential possibilities of this stream as from 450,000 to 600,000 horsepower, depending on whether flood waters are stored at its head or not. Except for that part of the stream embraced in the Northern project, those parts of the stream which the Northern excludes but the Pacific Gas includes compare favorably with the remainder of the stream as regards fall per mile so that their ultimate utilization is only a matter of time.

The original filings on this stream, together with the original surveys of both the Northern and the Pacific Gas projects, were made by the Northern California Power Company. These preliminary investigations were started in 1902 and after spending a number of years and a good many thousands of dollars, it was decided that the advantages of the present Northern project were so great as compared with any other that this ought to be the first development on the Pit River.

This decision was made after the most careful investigation had shown that this particular project could be constructed in less time and for less money than any project in the state of California, having an equal all year output. The present emergency only emphasizes these advantages and adds one more, which is now perhaps all important, and that is that, for an equal amount of power, far less man power will be requisitioned for this than for any other project.

SHORTAGE OF FUEL OIL

J. M. Buswell contributed the following: If it is true that the fuel oil supply will become exhausted in the near future to such an extent that it will be necessary to control the distribution of, not only the fuel oil, but electric energy generated by fuel oil, to what may be considered as non-essentials, it would seem advisable that the committee arrange to make an immediate survey or investigation, producing statistics that will establish the possible saving of fuel in two ways: First, by improving the load factor by changing loads from one time of day to another; that is, by improving the diversity factor of the various principal loads. Second, by reducing the peaks, by curtailing the distribution of energy to non-essentials, at least over the peak period, when it is customary to carry at least part of those peaks on steam units.

It might be suggested that these investigations be made before the crisis has been reached, so that, when the time comes, the companies will have data ready to show the field of possible fuel saving and the result of curtailment of profitable load, which will reduce the earnings, probably to such an extent as to require an adjustment of rates, in order to assure the operating companies a proper return.

WATER POWER CONSERVATION

The several papers on power conservation including the "Questionnaire" (p. 388), "Power Plant Losses," by R. J. C. Wood (p. 344); "Improvements in Water Wheel Efficiency," by E. C. Hutchinson (p. 404), and "Hydro-electric Economies," by J. P. Jollyman (p. 384), were discussed together. The discussion was opened with a written comparison of governing methods by **H. A. Barre**, as follows:

At the Big Creek installation there is no loss of water or power due to governing. The water conduit from Huntington Lake to Power House No. 1 is entirely a pressure system, so that the whole lake is the forebay.

A pond is formed below Power House No. 1 and is connected with Power House No. 2 by a similar pressure conduit and, therefore, acts as a forebay for Plant No. 2. This pond has a draw down capacity of 53 acre feet, or enough to supply Power House No. 2 for nearly four hours.

Both power houses can, therefore, follow the fluctuations of the load without any noticeable time lag.

The control of the water nozzles is by means of a needle valve in a fixed position, which opens and closes in direct response to the governor. If the closing is at such a rapid rate that the pressure in the pipe line increases above a predetermined limit, the bypass opens and discharges enough water to prevent a further increase.

As the pressure falls the bypass closes slowly until the water is entirely shut off.

The contents of the pressure system are such that the drop in pressure on full load opening at the maximum rate, causes such a small drop of pressure that it has no objectionable effect.

The ordinary operations of closing do not produce a sufficient rise of pressure to cause the bypass to operate.

When a very rapid closing takes place, the bypass, or pressure regulator, opens and discharges for a short time, as before described.

Each pressure regulator seldom operates more than seven to ten times per month.

In fact, it may be safely stated that more water has been wasted by routine testing of the regulators than by their operation.

TABULATED DATA CONCERNING OPERATING CHARACTERISTICS OF GOVERNING AND PRESSURE REGULATING SYSTEM OF BIG CREEK PLANT NO. 2

Pipe line length	4900 ft.
Maximum velocity based on average diameter	13.75 ft. per second
Pressure variation at nozzle without pressure regulator:	
Closing time 2 seconds	Pressure rise 75%
Closing time 2½ seconds	Pressure rise 55%
Opening time 3½ seconds	Pressure drop 27%
Pressure variation at nozzle and water wasted, with pressure regulator and closing times tabulated:	
Capacity of bypass in terms of nozzle capacity	100%
Full capacity closing time of nozzle	2½ seconds
Full capacity closing time of pressure regulator	20 seconds
Secondary pressure rise at nozzle	6%
Total waste of water on short circuit is equal to full jet discharge for about	9 seconds

Plant No. 1 has the same general characteristics as Plant No. 2, but differs slightly in length of pipe line and other details which determine the pressure variation.

C. O. Poole stated that the experience of the Southern Sierras Power Company has demonstrated the superiority of the bypass needle valve over deflecting nozzles.

John A. Koontz of the Great Western Power Co., in discussing water conservation with turbines, cited a 3 to 4 per cent saving accomplished by the use of replaceable wearing bands shrunk over the outside of turbine runners. The runners are renewed or built up by oxy-acetylene welding, thereby not only saving water but also adding to the life of the runner.

F. D. Nims of the Washington Coast Utilities Co. abstracted a paper contributed by J. B. Fisken of the Washington Water Power Company, giving the results of an investigation of water velocities and separation of losses in a 3260 horsepower turbine installed

by I. P. Morris Co. at Post Falls, Idaho. Pilot tubes were employed in the test and every precaution taken to get the most accurate measurements. At a load of 3310 horsepower an assumed water wheel efficiency of .845 and an effective head of 53.01 feet, the total loss of head was 8.34 feet, distributed as follows:

Forebay to beginning of elbow	5.04%
Beginning to end of elbow	3.24%
Elbow to wicket gates	11.52%
Runners and bearing friction	68.45%
Draft tube and outlet	5.64%
Velocity head of discharge water	6.11%

Mr. Nims advised holding low vacuum at the end of the draft tube.

C. O. Poole concurred in the idea, but stated that to prevent hammer this was sometimes deliberately ignored.

Mr. Milford of the Northern California Power Co. stated that a 1-inch standard lip faucet installed in the draft tube had stopped all trouble from water hammer and caused no changes in vacuum head.

E. C. Hutchinson of the Pelton Water Wheel Company stated that water hammer vibrations occurred when a turbine is underloaded. If the draft tube is kept full they will not occur.

P. O. Crawford of the California-Oregon Power Company described the equipment of the new Copco plant.

J. M. Buswell of the San Joaquin Light & Power Corporation told of water saving that has been effected in several of their plants by the substitution of auxiliary relief nozzles for deflecting nozzles and by utilizing a small drop below the Crane Valley reservoir to operate a 600 kw. unit.

H. H. Schoolfield of the Pacific Power & Light Company described changes in the Natches canal whereby 50 ft. lost head was utilized to operate a 1900 horsepower turbine driving an induction generator floating on the system and operating automatically.

Paul M. Lincoln of the Westinghouse Electric & Mfg. Co., H. H. Schoolfield, J. M. Buswell, E. C. Hutchinson and J. P. Jollyman participated in discussion on the possibility of providing absolutely automatic operation of induction generators and the advantages and disadvantages thereof.

TRANSMISSION AND DISTRIBUTION LOSSES

R. E. Cunningham's paper (p. 349) was abstracted by the author.

S. J. Lisberger of the Pacific Gas & Electric Company remarked concerning the lowness of the losses shown, and mentioned the difficulty of making a real comparison of different systems because of different bases of comparison. Distribution losses are especially difficult to analyze. He believes that a reasonable number of transformer burn-outs is good operating practice, and in the replacement of old meters by new types.

H. A. Barre emphasized the high cost of high-grade service. More transformers are installed than are actually needed, expensive precautions are taken to insure continuity of service, whereas true efficiency would supply current in the shortest, quickest and easiest way.

L. S. Ready of the California Railroad Commission cited cases where the public had been educated to expect too high a grade of service and unnecessarily large investments made to insure 98-99 per cent continuous service.

L. M. Klauber of the San Diego Consolidated Gas & Electric Company described the working of a system whereby the engineering department is kept informed of changes in load conditions so that transformers may be immediately disconnected. He also brought out the point that dairies, incubators and other forms of agricultural power utilization required a very high grade of service.

R. S. Masson of the Arizona Power Company suggested varying rates for differing service, a low rate for 95 per cent service and a higher rate for 99 per cent service.

L. S. Ready spoke of the difficulty of giving two classes of service from the same line, and suggested that a discount might be given for poor service. Complaints are largely due to lack of education.

P. M. Downing brought out several practical objections to Mr. Masson's suggestion.

J. M. Buswell explained how necessary shutdowns have been minimized by a loop system of distribution.

S. J. Lisberger showed the reasonableness of an irrigation consumer's complaint when a noon pump shut-down prevented the operation of his electric range. He recommended a 4000-11,000 volt combination in distribution line practice as being the most economical.

STEAM POWER PLANT ECONOMIES

R. J. C. Wood of the Southern California Edison Company, in contributed discussion, advocated conservation of steam used for atomization by cutting down the number of burners in service when running a boiler on partial loads. The real atomizing efficiency of a burner should be stated in terms of pounds of steam required per pound of oil burned, and not as a percentage of the total evaporation. The results obtained with burners in the Long Beach plant shows practically an inverse ratio as follows:

Lbs. of oil per burner per hr..	400	600	800	1000	1200	1400
Lbs. of steam per lb. of oil..	.410	.273	.205	.164	.136	.117

This represents from 3 to 1 per cent of the total steam used.

The advisability of extra heat insulation for boilers is purely an economic question dependent upon the price of oil and the number of hours per annum of boiler service as compared with the cost of insulation. Likewise with soot-blowers, which remove misplaced heat insulation.

Draft gages, CO_2 recorders and temperature indicators are well worth while in the boiler room if in charge of a competent man responsible for their upkeep. Otherwise, only disappointment will result.

A rough and ready rule for determining the proportion of electric and steam driven auxiliaries to be used is to use steam up to the point where the feed water will not absorb any more. A glance at the exhaust pipe will indicate if any exhaust steam is being wasted; and if so, some steam driven auxiliaries should be shut down and the corresponding electric driven units started in their place. Mr. Wood has had the same experience as the San Diego Consolidated Gas & Electric Company in choking the steam passages with an excess of condenser tubes and getting an increase of vacuum after removal of some tubes.

W. G. Vincent, Pacific Gas & Electric Company, noted a variation of from 1 to 4 per cent of steam required for atomization by different companies reporting, and suggested investigation by a sub-committee.

Chas. S. Delany, Pacific Gas & Electric Company, pointed out that 90 per cent of engine room efficiency is due to design and 10 per cent to operation, whereas in the boiler room operation is the all important thing. The boiler room should be well equipped with instruments that will give the operator full information about conditions and also check up his work. Such scientific methods will increase plant efficiency at least 10 per cent over haphazard operation.

Any endeavor to maintain continuity of service detrimentally affects the efficiency of the plant. Today efficiency is paramount to continuity of service.

S. J. Lisberger contended that the term kilowatt hours per barrel of oil is misleading as applied to Pacific Coast plants with low load factors. A curve plotted to show the barrels of oil burned as compared with the number of kilowatt hours generated gives approximately a straight line which is a good index of standby requirements of a plant and also an incentive to plant operators in trying to improve efficiency.

W. G. Vincent deduced the equation of this line as bbl. of oil $= C + a X$, when C is a constant depending upon the boiler equipment of the plant, A is a constant dependent upon the kind of oil and X the number of kilowatt hours generated.

John A. Koontz explained that the high efficiency shown by the Great Western Power Company plant was due to the method of operation either under full load or solely as standby, the hydro-electric plants taking care of variation in load.

R. S. Masson described the refinements introduced in the new plant of the Arizona Power Company near Jerome, where oil costs $2.50 per barrel. An efficiency was obtained of 1 lb. of oil per kw. hr. under test conditions (334 kw. hr. per barrel) and 256 kw. hr. per barrel under actual operating conditions with 29 per cent load factor. The initial cost was $105 per kilowatt of installed capacity.

Edwin A. Rogers has found that the elimination of the human element in the boiler room greatly improves efficiency. He described an installation of the Merit oil firing system and of Cope regulators in the Palace Hotel, San Francisco, where from 79 to 80 per cent average operating efficiency is obtained and two firemen eliminated. This 4 per cent saving in fuel and $200 in labor gave a total saving of $500 per month.

Geo. E. Quinan of the Puget Sound Traction, Light & Power Company contributed answers to the questionnaire received from various members of the Northwest Electric Light and Power Association.

POWER PLANT ECONOMIES IN THE NORTHWEST HYDRO-ELECTRIC ECONOMY

1. What percentage of the theoretical energy in the water taken by any of your power houses is realized at the busbar?

Washington Water Power Company—Post Falls, 81.4%; Little Falls, 84.1%; Long Lake, 83.5%—on guarantees.

Oregon Power Company—65%.

Portland Railway, Light & Power Company—We have no means in use whereby this is determined.

2. Where this is known, how do you measure your water?

Washington Water Power Company—Water wheel tests were made at Little Falls. Practically same method was followed for the tests at Post Falls.

Oregon Power Company—By flow meter and cross section.

Portland Railway, Light & Power Company—See answer to Question 1.

3. To what extent does it pay to get an accurate measurement of the amounts of water going through your plant?

Washington Water Power Company—It paid well to accurately measure the water going through the wheels while under test, as the efficiency was a material factor in determining the price to be paid the manufacturers. Except for this reason it does not pay in any degree to measure the water going through the plants accurately. A general knowledge of the amount of water which is drawn from yearly storage through the Post Falls plant is all that is necessary and this is arrived at from the load carried by the plant.

Portland Railway, Light & Power Company—See answer to Question 1.

4. Have you on impulse wheels any automatic system of closing needles to reduce deflection of nozzles, or of closing bypasses opened by falling loads, and to what extent do they improve your water economy?

Portland Railway, Light & Power Company—Do not have any impulse wheels installed.

5. Have you any cases of special value involving the use of forebays or afterbays to avoid spilling water on account of daily load variations?

Washington Water Power Company—See Question 8.

Oregon Power Company—Yes.

Portland Railway, Light & Power Company—Every forebay is of value in carrying our load, which has less than 100% load factor. We have two hydro stations with forebays which are of special value in carrying less than 100% load factor loads.

6. Have you any information of the effect of bucket wheel renewals in efficiency, and can you throw any light on the problem as to when it pays to replace buckets to maintain efficiency?

Oregon Power Company—This company operates two 18-inch double horizontal Victor turbines in its Albany Plant under a mean head of 48 feet. Quite frequently the buckets are broken out and the efficiency of the wheel considerably reduced, according to the number broken. We find that it is best to rebuild the buckets by welding. If this is not done there is considerable water thrust on the bearings which has a tendency to spring the shaft, making it necessary to replace the runners in course of a very short time.

Portland Railway, Light & Power Company — Possibly the question refers to impulse wheels. In case turbine wheels are referred to, we have no tests to show effect on efficiency and as a basis for changing wheels. Have experienced trouble with buckets of turbine wheels wasting away on back side in a number of instances. This is a serious trouble.

7. Have you had any wheels, nozzles or buckets replaced by other or improved design, and if so, what data have you on the betterment?

Oregon Power Company—This company is now contemplating the installation of new runners in the wheels referred to in the preceding question, with a more improved type. The manufacturers of the wheels have supplied us with data to show that the new runners will increase the capacity of the wheels 10 per cent at an expense of $10 per horsepower for the increase.

Portland Railway, Light & Power Company—Wheels replaced gave trouble from breakage of turbine buckets. New wheels have no trouble.

8. Can you give data on other hydraulic economies of general interest?

Washington Water Power Company — There are four plants on the same river which is fed from a lake of about 45 square miles area with a controllable depth of about 6 feet. The plants are in the following order: Commencing from the lake, Post Falls, Spokane, Long Lake, and Little Falls. After the spring flood water is passed the controlling gates and bear trap dams at Post Falls are closed and as far as possible only sufficient water is passed through the Post Falls plant to enable the other plants to carry the proper load without losing any water over the dams. The problem is complicated by the time element of flow between the plants and by the necessity of furnishing sufficient water for operation of the city's pumping plant and the Inland Empire Railway Company's power plant. Water cannot be conserved at Long Lake, as that plant is only equipped for an output of 25% of its ultimate capacity.

Questions 4, 6 and 7 are not answered, as presumably they refer to impulse wheels, and we do not use any.

TRANSMISSION AND DISTRIBUTION ECONOMIES

1. What percentage of your total energy generated is sold to consumers?

Washington Water Power Company—78.1%, approximately.

Oregon Power Company—72%, approximately.

Portland Railway, Light & Power Company—76.3%, approximately.

2. Of the difference between the two, do you know how much is lost in your transmission system, and how much in your distribution system; that is, have you sum totals of metered energy passing through your distribution substations?

Washington Water Power Company—No information is given as to the differentiation between "Transmission" and "Distribution," but for the purpose of furnishing the information asked for the low voltage feeders from the power stations and substations in Spokane were considered "Distribution Lines," and all others were considered as "Transmission Lines."

The losses there are as follows, approximately:

In Transmission System, 59.3%.

In Distribution System, 40.7%.

Oregon Power Company—18 per cent in transmission system and 10 per cent in distribution system.

Portland Railway, Light & Power Company — Loss in transmission, 7.9%. Loss in distribution, including 600 volt railway and other conversions, 15.8%.

3. What steps have you taken to reduce transmission and distribution losses, and what results do you estimate from such steps?

Washington Water Power Company—As yet none. Owing to power plant over-development the losses have not been such as to justify any capital expenditure to reduce them. Considerable expenditure is now being made to improve regulation by increasing line conductivity and this will of necessity decrease the percentage loss.

Oregon Power Company—We have provided disconnecting switches so as to remove certain step-down and step-up transformers during the light load period, so as to overcome excessive transformer charging current. This will result in a reduction of 25% in transmission losses.

Portland Railway, Light & Power Company — We endeavor to maintain balance between economy and cost.

STEAM PLANT ECONOMIES

1. What number of kilowatt hours per barrel of fuel oil do you obtain from each or any of your steam plants, giving brief description of plant and load conditions?

Portland Railway, Light & Power Company—Plants under standby mostly. Burn sawmill refuse (hog fuel) principally. Fuel oil used only in emergency and have no data on fuel oil alone under running conditions.

2. Does it pay to test fuel oil when purchased for gravity, percentage of moisture and calorific value?

Oregon Power Company—Yes.

Portland Railway, Light & Power Company—We never have confined ourselves to test specifications.

3. Have you any definite data on the percentage of steam used in atomization of fuel oil?

Oregon Power Company—0.529 lbs. steam per lb. oil.

Portland Railway, Light & Power Company—No.

4. What has been your experience with heat insulation of boiler settings?

Oregon Power Company—Properly insulated boilers will effect saving of 20 per cent.

Portland Railway, Light & Power Company—Have had no trouble. We use ordinary settings.

5. Do you use economizers, and if so, what feed water temperatures do you get ingoing and outgoing?

Portland Railway, Light & Power Company—One plant has economizers. Ingoing feed water, 164 deg. F. Outgoing, 240 deg. F.

6. Have you had any experience with automatic control of dampers, fuel oil supply, etc.? If so, with what results?

Oregon Power Company—This company has installed in its Springfield plant one Mason regulator which gives entire satisfaction.

Portland Railway, Light & Power Company—No.

7. Have you modified your furnaces to improve efficiency, and if so, with what results?

Oregon Power Company—We found from tests that it is best to have as large a space as possible between the grate bars in order to increase the draft area. This not only increases the capacity of the boilers, but it also helps to keep the grate bars cool. We also find that it is best to install hollow rest bars under the grate in the ovens, which allows a constant circulation of water through the rest bars. We also keep a constant supply of water in the ash pits. The condensation of this water has the effect of keeping the carbon deposit on the grates soft so that same can be removed easily when the clinkers are raked.

Portland Railway, Light & Power Company—Furnaces arranged to get best results using hog fuel regularly and fuel oil in emergency.

8. Have you any fuel oil burner that you consider superior in the matter of efficiency. If so, give data.

Oregon Power Company — Inside mixer burners such as the Hammel have given good efficiency in our Springfield generating station at Springfield, Oregon.

Portland Railway, Light & Power Company—The Hammel burner does very well under our conditions.

9. To what extent does it pay to equip your fireroom with indicating or curve-drawing instruments, such as draft gages, flow meters, pyrometers, temperature recorders CO_2 indicators, etc.?

Oregon Power Company — In modern power plants the installation of the above instruments is a necessity.

Portland Railway, Light & Power Company—It pays to the extent that the data shown by the instruments affects the practical and efficient operation of the plant. We favor most of the instruments enumerated for a plant which runs continuously during any period.

10. What is your opinion on steam versus electric auxiliaries, with special reference to heat balance, assuming the use of feed water heaters?

Oregon Power Company—We favor steam auxiliaries.

Portland Railway, Light & Power Company—Should use some steam auxiliaries with feed water heaters, but prefer electric drive for most of the auxiliaries.

11. How high a vacuum do you carry, and is this measured at the turbine discharge or at the vacuum pump suction?

Oregon Power Company—28-inch, measured at turbine discharge.

Portland Railway, Light & Power Company—Carry 29 inch, measured at turbine discharge.

12. Have you experimented with steam lanes, baffles, etc., in your condensers, and if so, with what results?

Portland Railway, Light & Power Company—No.

13. Have you any data on improvement of vacuum to be obtained by increasing your circulating water supply, and relative costs and benefits to be derived?

Oregon Power Company—This company has installed in its Springfield generating station at Springfield, Oregon, a Worthington 2½-inch two stage Hotwells pump for a condenser for a 2000 kw. General Electric turbine. An investigation into this matter shows that much better results can be obtained by the replacement of this apparatus with a Radojet Air Pump. This equipment would not only occupy much less floor space, but would be considerably more efficient.

14. What economies of fuel or increase of efficiency have you been able to obtain in your steam plants by other means than those mentioned above, giving particulars?

Oregon Power Company—Under ordinary conditions this company uses sawdust, planer shavings, slabwood and mill refuse in its Springfield generating station, and we find that by making the fuel distributing system over the boilers automatic and by feeding a certain supply of fuel constantly on the fire that much better results can be obtained. Before this automatic device was installed we would fill the ovens with fuel, and this practice was found to result in the decrease of the efficiency of the boilers until such time as the fuel would burn to the point where the maximum heat was obtainable. Under the arrangement now in effect the fuel is always at red heat.

Portland Railway, Light & Power Company—See answers to other questions.

NORTHWESTERN ELECTRIC COMPANY—ANNUAL OPERATING RATIOS

	1916	1917
Per cent—Transmission Line loss of delivered to line	8.68%	7.88%
Per cent—Pittock generated of total generated and received	7.1 %	9.29%
Per cent—Station Light and Power of total generated and received	2.01%	2.22%
Per cent—Portland Stations, Tie Lines and Transformation losses of delivered to Portland stations	14.5 %	12.43%
Per cent—Distribution losses of delivered to Distribution System	4.7 %	4.32%
Per cent—Sold to Consumers of total generated and received	80.0 %	81.2 %
Per cent—Total Loss to System of total generated and received	20.00%	18.8 %
Per cent—Average generated at Condit Plant of its rated capacity	57.2 %	65.7 %

F. D. Nims explained that in utilizing powdered coal better results are obtained from the poorer grades. In using hogged fuel 400 kw. hr. are obtained per unit (200 cu. ft.) An ordinary sawmill produces about one unit per thousand feet of board cut.

L. M. Klauber, San Diego Consolidated Gas & Electric Company, described an automatic system for controlling hot oil flow which cost much less and is nearly as effective as more expensive installations. He advocated constant use of soot blowers and tube cleaners in boilers and an air and water cleaning spray in condenser tubes.

John R. Brownell of the California Industrial Accident Commission stated that the life of the boiler may be prolonged by water treatment instead of cutting the scale.

S. J. Lisberger described a simple device for determining the salt content of boiler water; a maximum of 50 gms. per cm. being allowed.

IRON AND STEEL CONDUCTORS

R. C. Powell's paper (p.338) was summarized by S. J. Lisberger, who pointed out that iron wire can economically be used for small loads, but that stranded cable has less reactance with heavier currents and can be used for guy wire in the future.

L. M. Klauber stated that the San Diego Consolidated Gas & Electric Company has built 300 miles of steel conductor line, using it to advantage (1) for long spans requiring high tensile strength, (2) lightly loaded main lines of moderate length, (3) for 2300, 6600 and 11,000 volt branch lines, (4) series circuits. He believes that those who have used it will not go back to copper, regardless of price, because the ratio of copper to steel prices will probably be the same. Much of the construction is with 700 ft. spans and 40 ft. poles with 4 ft. triangular clearances. Two poles are used for spans of over 1000 ft., no poles being placed in any stream bed, no matter how dry. Single galvanized steel cable corrodes, but extra galvanized has an indicated life of 15 years in salt air. A special device is employed for painting long spans every two years.

Standardization of Pin Type Insulators

Discussion of the committee report on "Standardization of Pin Type Insulators" (p. 333) was introduced with the following written communication:

J. P. Jollyman: The committee has recommended the use of the higher efficiency types of insulators for Class 4 and Class 5 service after calling attention to the advantages of this type as compared with the older or standard types.

The higher efficiency type, while in many ways much better than the standard types, has two characteristics which are not as good. First, it has a lower striking distance. Second, it has a lower effective surface resistance. The lower striking distance gives the insulator a greater factor of safety against puncture and this may be a valuable characteristic in districts where lightning is frequent and where the older types are liable to puncture. In districts subject to heavy fogs or other conditions leading to the liability of flashover from excessive surface leakage, the shorter striking distance may be a disadvantage.

While the method of computing the true relative surface resistance of insulators has been generally known since it was given by Mr. A. O. Austin in his paper on suspension insulators in Proceedings A. I. E. E., Vol. 30, 1911, the manufacturers have never given this function in their catalogue data but continue to give "leakage distance," which is not a true basis of comparison.

Considering the two types of 27 kv. insulators illustrated in the report the following comparison will serve to illustrate the points mentioned:

	Standard	Higher Efficiency
1. Actual leakage distance of top from tie wire to cement joint, inches	5	5½
2. Actual leakage distance of center from cement joint to pin, inches	8½	6½
3. Per cent relative resistance of top, tie wire to cement joint	26.6	40.0
4. Per cent relative resistance of center cement joint to pin	73.4	60.0
5. Relative surface resistance of the two types, per cent	117.0	100.0

In items 4 and 5 the effective surface was considered as ending when the lower end of the petticoat next to the pin was reached in the higher efficiency type and when a point 1 inch from the pin thread was reached on the inside surface of the center of the standard type. The surfaces beyond those considered above are so close to the pin as to be ineffective under the conditions when surface leakage becomes important.

It must be conceded that the higher efficiency type will not lose effective leakage surface due to tilting on the pin, whereas the standard type may lose most of the surface on the inside of the center due to this trouble. Such a condition will reduce the effective surface resistance of the standard type to 86% of the surface resistance of the higher efficiency type.

Flashovers of insulators sometimes take place when conditions giving rise to excessive surface leakage occur. Heavy fogs, especially near the sea coast, and possibly the sudden formation of dew, give rise to surface conditions which permit high leakage, and this is sometimes followed by a flashover. Where such conditions occur a type of insulator having a high surface resistance and a long striking distance should give superior service. In bringing out their higher efficiency designs the manufacturers have improved their insulators in many ways, especially mechanically, but have not greatly improved their surface leakage characteristics. It is these characteristics that are most important where lightning is infrequent and surface conditions are bad.

It does not appear that the higher efficiency types of insulators are much, if any, better than some of the older types from the standpoint of their ability to resist flashover under favorable surface conditions.

P. M. Downing stated that no close relationship exists between standardization of line voltage and standardization of insulators. For example, a 60,000 volt insulator in some situations is not suited for 11,000 volts under other conditions. Catalogue classifications should be based on duty to be expected from an insulator under given climatic and operating conditions.

C. O. Poole, in response to a question by S. J. Lisberger, advised that the Southern Sierras Power Company has

used higher efficiency insulators. A reduction of leakage surface corresponds to a like reduction of efficiency. He prefers designs having large open space between petticoats. He suggested that the standardization of voltages instead of insulators would make the manufacturers' problem easier.

L. M. Klauber reported that the San Diego Consolidated Gas & Electric Company was using higher efficiency insulators in localities exposed to salt spray and had experienced no flashovers or break-downs in two years time. With regard to the large number of types of insulators available for the same service, he brought out the point that fewer types would make possible lower prices.

G. I. Gilchrest, research engineer, Westinghouse Electric & Mfg. Co., contributed the following written discussion:

The standardization of pin type insulator designs based on the diameter of pinhole, height and type of pin and overall dimensions of the insulator, appears logical. An opportunity is thus given the insulator companies to deviate in the details of design and to add improvements in the insulators which appear feasible as the insulator art advances.

The Standardization Committee of the American Institute of Electrical Engineers is considering the standardization of transmission line voltages. Any standardization of pin type insulators will eventually be based upon the finally accepted transmission line voltages. If the insulator manufacturer could then include all the standard designs under one general type, the material advantages would be gained by both the producer and the purchaser.

The line voltage ratings listed in the insulator catalogues represent what is considered good practice in localities having favorable climatic conditions. The dry and wet flashover voltages and line voltages specified by one manufacturer on a particular design often vary from 20 to 25 per cent from the values specified on the same design by another manufacturer. This deviation is due to the methods of test used and to the factor of safety assumed by the manufacturer, rather than to any inherent properties of the porcelain body.

It would appear that the line voltage ratings of a manufacturer's standard line of insulator designs should be based on a summation of operating results that could be furnished by transmission engineers and which represent the line voltage ratings that they consider good practice in localities which afford fairly severe climatic conditions. Furthermore, from a general consideration of the problem of insulator application it would seem that each insulator design should be recommended as a standard at two or possibly three line voltages, depending on the climatic conditions involved. For example, a unit rated by the manufacturer at 33,000 volts might be standardized as follows:

(a) To be installed on 44,000 volt lines that are located in sections where lightning storms are practically unknown, wooden construction is used and the air is clean and dry.

(b) To be installed on sections of 33,000 volt lines where the climatic conditions are fairly severe and steel construction is used.

(c) To be installed on sections of 22,000 volt lines where the climatic conditions are unusually severe and steel construction is used.

Likewise, a design rated by the manufacturer at 44,000 volts might be recommended for 33,000, 44,000 and 55,000 volt service. Of course, the type of customers served, etc., have a very important part in determining the factor of safety that should be used on any section of line. If the units are designed so as to overlap in this manner the problem of maintaining the desired service on all sections of the system should be partially solved.

The larger transmission companies can afford to maintain an engineering staff that recommends the proper insulator for every section of line. However, the smaller operating companies which represent a considerable proportion of the power supply of the country, depend upon the catalogue ratings, the salesman's recommendation and the existing practice of the larger transmission companies. Therefore, line voltage ratings based on operating experience would be a material benefit to the transmission companies in general and would tend to minimize the number of unsatisfactory installations that are caused by using an insulator design which has too low a factor of safety. Moreover, a standardization of transmission line voltages and a standardization of methods of test used by insulator companies to obtain flashover ratings of the insulators would doubtless make the problem of insulator standardization less complex.

H. S. Perkins (contributed): The recommendations for 6600 volts and 11,000 to 15,000 volts, coast districts, in Table 7 of the report, while based on the consensus of opinion in

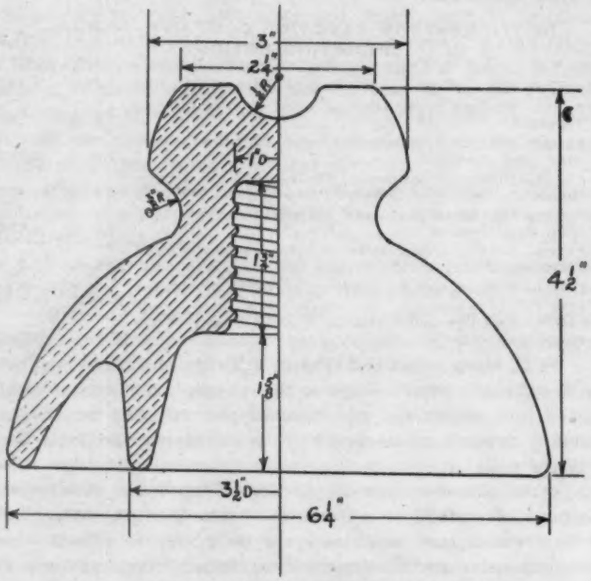


Fig. 1—Suggested Insulator Design—6600 volt type

this territory, might be slightly modified in design so as to also meet the needs of other sections.

The 6600 volt type is designed with a petticoat whose inside diameter too closely approaches the outside diameter of the pin to allow safe operation. The air-gap, or striking distance, between the pin and the lower edge of the skirt will

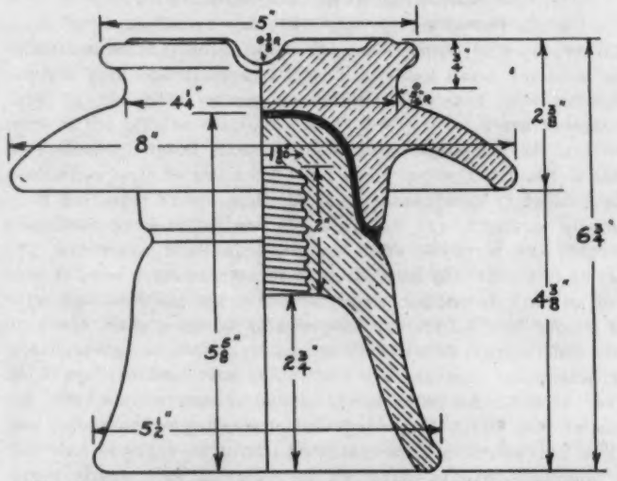


Fig. 2—Suggested Insulator Design—11,000 to 15,000 volt type

allow a shunting of the recessed surface of the petticoat, thus losing effective resistance where it is most essential. Wooden pins, used notwithstanding the recommendation for iron pins, are here liable to corrode. The design of Mr. J. P. Jollyman (Fig. 1) meets this difficulty and provides better surface insulation than any type now on the market. It would well re-

place all 11 to 17 kv. types used for 6 to 8 kv. severe service on the coast.

The same objection as to ineffective surface insulation applies to the type recommended for 11,000 to 15,000 volts. coast service. These objections are met by a new insulator of more efficient design (Fig. 2) which should supersede the older type.

This proposed insulator has the same exterior dimensions as that recommended, thus allowing the use of the same pin length. Its thicker porcelain allows a higher flashing potential by its reduction in charging current. Its surfaces are arranged to take the proper proportion of voltage stresses under varying weather conditions. Its greater mechanical strength allows increased pole spacing.

Insulator manufacturers will gladly co-operate with the committee in putting these recommendations into effect and thus bring about a reduction of the number of types in use.

SUBSTITUTE FOR CEDAR POLES

The discussion of L. M. Klauber's paper on "Substitute for Cedar Poles" was opened by **R. E. Cunningham** of the Southern California Edison Company with the following paper:

As Mr. Klauber's paper leaves open the question of length of service to be obtained from Douglas fir, it is possible that some definite idea can be obtained from the report of the U. S. Department of Agriculture Forest Service on experiments with Western yellow pine. I understand that the Western yellow pine has much the same characteristics as Douglas fir.

In 1906 the Forest Service began a test on the treatment of poles, known as Project L-34. A large number of cedar and yellow pine poles were treated in an experimental plant installed at Wilmington, California, and these poles were set in regular line construction by a number of power and telephone companies, reporting back to the government date and location where poles were set. The following is a complete copy of the last progress report covering the experiment on yellow pine poles, which I believe is of special interest to us at this time. By the government's report it would appear that hot creosote open tank treatment will preserve the butts of the poles a reasonable length of time, but some method should be adopted for preserving the portion of the pole above ground.

"REPORT ON SPECIAL PINE POLES"

The Western pine poles installed in and near Los Angeles under this project comprised a special shipment of 81 35-foot poles cut at Pine Ridge, Madera County, California, in summer of 1906. They were to be used in trying out a new apparatus designed to treat only the butts under pressure. Upon trial this apparatus was found to be impracticable because it could not be made to prevent loss of preservative through season checks in the poles. Forty-eight of them were therefore given the ordinary open tank treatment with carbolineum.

After treatment the poles were distributed among the six co-operators in Los Angeles. Subsequently the U. S. Long Distance Telephone & Telegraph Company became a co-operator by taking over most of the experimental poles owned by the Home Telephone Company. Nearly all installations were made in 1907-1908, three being recorded as set in 1909.

A few of the poles were carried away by floods, one was broken in moving and twelve have since been removed because new construction required higher poles. The total number included in this report is fifty. The result of the inspection is as follows:

Condition of Butts, November, 1916

Treatment—	Sound	Rotted Off	Total
Cresote, tank	25	0	25
Carbolineum, brush	0	11	11
Untreated	0	14	14

This table includes all of the carbolineum brush treated poles in the experiment, and all untreated poles for which there were setting records, except such as were destroyed by floods.

The average life of the poles treated with carbolineum was five years and two months. This includes two which were set in concrete and which remained in service two years and four months longer than any of those similarly treated and set directly into the ground. With these two omitted, the average life was four years and five months.

The untreated poles gave an average service of three years and six months. This includes one set in concrete which remained in the line three years and two months longer than any untreated pole in the experiment set directly into the ground. Two others set in concrete lasted four years and eight months and five years. With these poles omitted, the average life was approximately three years.

Though all of the poles treated with creosote by the open tank method are sound below ground, i. e., in the portion treated, nine show serious decay in the tops. One untreated pole which was stubbed when rotted off shows serious top decay. One which failed before 1912 and which had been attacked by woodpeckers, was decayed below the nest. At least two of the untreated poles were attacked by insects below the ground line, decay being hastened considerably thereby.

Summary

Western yellow pine is not a satisfactory pole timber for use in the vicinity of Los Angeles.

1. Untreated Western yellow pine poles show an average life of about three years.
2. Such poles, given a brush treatment (2 coats) with carbolineum last about four years and five months.
3. Such poles given an open tank treatment with creosote show 100 per cent of butts sound in 8¾ to 9¾ years.
4. Of 28 such poles in service 8 2/3 to 9¾ years, eleven or 39.3 per cent show serious decay in the tops.
5. A brush treatment with carbolineum is not a satisfactory protection for such poles.
6. An open tank treatment with creosote has given perfect protection over a period of 8¾ to 9¾ years.

E. A. Quinn said that the San Joaquin Light & Power Corporation is using Port Orford cedar instead of treated poles. Tamarack pine poles, given an open tank butt treatment, and put in the ground in 1908 with 33 lbs. of creosote per pole, all had to be stubbed within five years.

C. O. Poole cited satisfactory results with lodge-pole pine poles treated in a temporary portable tank in 1908. Although no penetration was perceptible after 24 hours boiling, yet 600 poles thus treated lasted nine years.

S. J. Lisberger reported that the Pacific Gas & Electric Company is using concrete reinforcing stubs, as is likewise the Pacific Telephone & Telegraph Company. Stubbed poles that have been in service three or four years are still as good as ever. This affords material relief from the shortage of poles and reduces the cost of labor.

E. R. Northmore of the Los Angeles Gas & Electric Company has concluded that concreting old poles does not pay because the rot follows up to the top of the concrete. He prefers treated stubs.

L. M. Klauber believes that concrete stubbed poles which have been in service at San Diego for nine years are as strong as when first put in. There is no danger in this method if all the old rot is cut out and replaced by a 4 to 6 inch concrete collar with mesh reinforcing. At present prices of 30 cents a foot a new pole costs about $50 to set in place, including labor, whereas $7.50 will pay for reinforcing.

INSULATOR DETERIORATION

The report of the committee on insulator deterioration as presented by Mr. John A. Koontz, brought forth no important oral discussion. Several written contributions were received, as follows:

H. Michener: The experiences with suspension insulator depreciation on the lines now constituting the system of the Southern California Edison Company, are set forth in Table 1. The great majority of the defective insulators were found by the megger. These figures do not indicate any law

TABLE 1

DEPRECIATION OF SUSPENSION INSULATORS ON TRANSMISSION LINES

Results of Tests on Southern California Edison System. All Tests Made With Megger Except as Noted

Line—	Voltage in Kv.	Length of Line—Miles	Date Put Into Service	No. Units Tested	No. Units Defective	Percent Defective	Time Since Previous Test—Mos.	Percent Depreciation per 12 Mos.
Big Creek Line—150 kv	150	240	Nov., 1913					
Eagle Rock to Magunden		100	Nov., 1913					
1915 Tests—Only a few tested.								
1916 Tests—March				31,997	510	1.6	28	0.7
1917 Tests—								
West Line—Jan. to March				36,516	1,050	2.9	11	3.2
East Line—Feb. to April				36,357	1,388	3.8	12	3.8
West Line—Mi. 210 to 240—August				11,868	1,428	12.0	5	29.0
East Line—Mi. 210 to 240—August				11,556	907	7.9	5	19.0
Magunden to Toll House		121	Nov., 1913					
1915 Tests—September				15,896	79	0.5	22	0.27
1916 Tests—May				18,932	154	0.8	8	1.2
1917 Tests—May				44,807	534	1.2	12	1.2
1918 Tests—April				38,538	428	1.1	11	1.2
Toll House to Power House		19	Nov., 1913					
1915 Tests—								
West Line—September				9,541	568	5.9	22	3.2
East Line—September				10,350	618	6.0	22	3.3
1916 Tests—March				19,712	1,186	6.0	6	12.0
1917 Tests—								
West Line—April				9,932	147	1.5	13	1.4
East Line—April				11,192	110	1.0	13	0.9
Fernando Line from								
Eagle Rock to Fernando Road	15	5½	Nov., 1913					
1916 Tests—March				414	104	25	27	11.1
1917 Tests—December				433	42	9.7	10	11.6
Line No. 3	15	7	Nov., 1913					
1916 Tests—August				666	10	1.5	33	0.5
Line No. 4	15	11½	March, 1914					
1916 Tests—May				970	64	6.6	25	3.2
Newport Beach Line	15	35.8	Feb., 1914					
1916 Tests—April				363	101	27.8	28	12.0
Vernon to Redondo	60	18¼	July, 1914					
[1]1916 Tests—March				1,092	143	13.1	21	7.5
1917 Tests—December				7,159	380	5.3	21	3.0
Line No. 2	60	15½	Nov., 1913					
1915 Tests—May				6,145	537	8.7	18	5.8
[2]1916 Tests—December				6,145	599	9.8	19	6.2
[2]1917 Tests—December				6,145	216	3.5	12	3.5
Borel Line—								
Eagle Rock to San Fernando Road	50	5½	Nov., 1913					
1916 Tests—February				1,875	414	22.0	27	9.8
1917 Tests—November				1,107	129	11.6	21	6.7
Line No. 10	60	50¼	August, 1913					
1915 Tests—October				11,863	627	5.3	26	2.4
1916 Tests—January				11,863	103	0.9	3	3.5
[2]1917 Tests—February				13,182	1,796	13.6	13	12.6
San Bernardino to Pedley	15	21.8	July, 1914					
1915 Tests—April				6,651	366	5.5	9	7.3
[4]1916 and 1917 Tests—								
August, 1916, to March, 1917				6,651	1,508	22.7	19	14.3
Fernando to Saticoy	60	48	Oct., 1915					
[3]1917 Tests—December				10,164	460	4.5	26	2.1
L. A. to Newmark	60	5½	Dec., 1912					
1916 Tests—Dead Ends Only—April				1,260	90	7.1	40	2.1
Dead Ends Only—Oct.				1,350	118	8.7	7	12.5
Suspension—October				1,342	23	1.7	47	0.4
Newmark to Chino	60	26	Dec., 1912					
1917 Tests—January				7,242	679	9.4	48	2.4
Chino to Colton	60	22	Dec., 1912					
1917 Tests—January				6,742	726	10.8	48	2.7
Long Beach to Newmark	60	20	1912					
1916 Tests—November				5,610	440	7.8	48	2.0
Long Beach to Katella	60	21	May, 1914					
1916 Tests—September				7,594	616	8.1	28	3.5
1917 Tests—May				7,594	305	4.0	8	6.0
1918 Tests—January				7,594	848	11.2	8	16.8
Katella to Fullerton	60	5	1916					
1917 Tests—April				3,662	64	1.7	12	1.7
1918 Tests—January				3,662	31	0.85	9	1.1
MacNeil to Sherman	30	7½	1914					
1917 Tests—May				1,202	75	6.2	36	2.1
Kern River Lines	60							
L. A. 3 to Fernando							about	
1917 Tests—September				6,729	467	7.0	3 yrs	2.3
Power House south—							2 and	
[5]1918 Tests—April				7,720	14	0.2	3 yrs	0.1

NOTES: 1. These insulators were on the first 53 poles on the Redondo end of the line.

2. These tests were made with the oscillator.

3. This test report shows 5,113 insulators tested, with the notation that all insulators were not tested on account of new type all being good. The original insulators were those designated as type "A," and the new type, which were placed after the December, 1916, test, are type "B."

4. This test consisted of megger, oscillator, and high potential tests on all units of this line. Previous to this test, the insulation consisted of three type "A" units in suspension and four type "A" units in dead end strings, and the line voltage was 15 kv. The operating records show that 2.1 per cent of these units failed on line trouble during the two to two and a half years of operation. After this test the first 12 miles out of San Bernardino was insulated with four type "B" units in suspension, and five type "B" units in dead end strings. The remainder of the line was insulated with four and five type "A" units which had passed the test.

5. See Table 2 for details of this test.

6. In contradiction to the apparent good performance of these insulators, judging from this megger test, it should be stated that seven insulator breakdowns occurred (18 units broken) on this section of line during the first three months of this year. This meggering was carefully done, even to the extent of overhauling the megger and then remeggering a whole day's work as a check. The insulation consists of four units in suspension and five units in dead end strings. The voltage varies from 75 kv. to about 70 kv. over this section of the line.

of depreciation. This may be because there is no such law, or because the megger is not a reliable instrument for picking out the defective insulators.

Of the insulators tabulated in Table 1, the approximately 185,000 located on the first eleven lines listed can be designated as type "A." These insulators are of the single piece, 10-inch diameter type, having pin and clevis hardware, grooved head and pin hole, cement entirely surrounding the head and upper end of pin, and no gasket to prevent lower edge of cap from bearing on the porcelain.

The approximately 50,000 insulators, located on the remaining eight lines listed, are all of the single piece, 10-inch diameter type, but the distribution of those having different detail characteristics is not known by the writer.

TABLE 2

RESULTS OF TESTS AND INSPECTION OF 10,450 TYPE "A" INSULATORS REMOVED FROM FERNANDO-SATICOY LINE

Removed November, 1917 — Tested December, 1917

	Kind of Test				Rejected by all Electrical Tests	Total Rejected
	Visual Inspection	Megger	Oscillator	High Potential		
Number units tested	10,450	10,164	6,644	9,842		
Number units rejected	286	130	169	161	460	746
Percent rejected	2.7	1.3	2.5	1.7	4.5	7.1

NOTE: Those rejected by visual inspection had been broken in handling.

TABLE 3

RESULTS OF HANDLING INSULATORS

10,450 Insulators Removed from Fernando-Saticoy Line and Shipped to Los Angeles — Tests Showed the Following Results

	Number Shipped	Number Broken when Received	Percent Broken when Received	Number Given All Three Elec'l Tests	Number Rejected by Electrical Tests	Percent Rejected by Electrical Tests
Shipped crated	9019	205	2.3	5997	301	5.2
Shipped uncrated	1431	81	5.7	911	59	6.5

TABLE 4

COMPARATIVE DEPRECIATION OF DEAD END AND SUSPENSION INSULATORS ON SOUTHERN CALIFORNIA EDISON SYSTEM

Line—	Number Units Tested	Number Units Defective	Percent Defective	Percent Depreciation in 12 Months	
				Dead End	Suspension
Big Creek Line—					
Eagle Rock to Magunden:					
1916 Tests—Dead End	19,878	293	1.5	0.6	
Suspension	12,119	217	1.8		0.8
1917 Tests—					
East Line—Dead End	19,800	893	4.5	4.5	
Suspension	16,557	495	3.0		3.0
West Line—Dead End	19,800	650	3.3	3.6	
Suspension	16,716	400	2.3		2.6
L. A. 3 to Newmark—					
1916 Tests—April:					
Dead Ends	1,260	90	7.1	2.1	
1916 Tests—October:					
Dead Ends	1,350	118	8.7	12.5	
Suspension	1,342	23	1.7		0.4
Borel Line—					
Eagle Rock to San Fernando Road:					
1916 Tests—Dead End	750	194	25.9	11.5	
Suspension	1,125	220	19.6		8.7
Line No. 2—					
1915 Tests—Dead End	724	172	23.8	15.9	
Suspension	3,146	132	4.2		2.8

TABLE 5

INSULATOR FAILURES WHILE IN SERVICE—SOUTHERN CALIFORNIA EDISON SYSTEM

	Dead End		Suspension		Approximate No. of Insulators on Lines Reported
	No. of Failures	No. Units Destroyed	No. of Failures	No. Units Destroyed	
During 1917	40	52	16	23	200,000
First 3 months of 1918	12	24	13	31	300,000

The insulator refererd to as type "B" is similar to the type "A," with the following exceptions: The cement that holds the cap extends only a short distance up the side of the head of the porcelain; the lower edge of the cap is separated from the porcelain by a gasket; and the cement does not extend across the upper end of the pin.

Table 2 shows the results of megger, oscillator and high potential tests on 10,000 type "A" insulators removed from the Fernando-Saticoy line. As a means of getting the best possible service from this line, all these insulators were removed and replaced by type "B" insulators. This case is cited primarily to show the loss which may occur from handling. Part of these insulators were crated in the standard shipping crates before being shipped to the testing yard in Los Angeles. The remainder were hauled in trucks in strings of three or six units without being crated. Table 3 shows the comparative results of these two methods of handling the insulators.

Table 4 shows some comparisons of the depreciation of dead end insulators and of suspension insulators.

The foregoing has dealt with insulator depreciation as indicated by tests. Table 5 shows the insulator failures which have occurred on this system during the past 15 months. These figures would be much more illuminating if the respective numbers of the dead end and the suspension insulators in service could be given. However, they do show that the greater number of failures occur on dead end insulators. But it must be borne in mind that at least part of this difference between the number of failures occurring on dead end insulators and on suspension insulators is due to the grounding of the insulator hardware on dead end insulators.

This company has now arranged to make much more complete reports of the insulator tests and insulator failures, with the hope that the information thus gained will be of some benefit.

H. S. Perkins: Insulator depreciation due to rapid changes of temperature can be lessened by using thicker porcelain than is found in the ordinary type of suspension insulator and by employing a white glaze. Thick porcelain gives greater diaelectric strength, higher corona break-down point and retarded temperature rise in interior parts of the insulator. The white glaze reflects the heat rays and particularly prevents their absorption by the insulator. Experiments with black, brown and gray glazes definitely prove that the gray glaze absorbs heat more slowly, and consequently the insulator is subjected to less rapid changes in temperature. It may also be beneficial to paint the hardware with aluminum paint.

Geo. M. Wills: When the insulator testing work of the Southern Sierras Power Company was started a year ago it was without precedent or past experience of other companies to follow. Being equipped with a 110 or 120 kv. 60 cycle transformer and a 110 to 125 kv. 200,000 cycles oscillator, it was first decided to give each insulator unit a 30-second test with the 60 cycles flashover and 15-second test with flashover voltage from the oscillator.

It was soon found that most of the bad units were discovered soon after the application of the stress and that a continued application of flashover voltage caused units to break down that apparently had some insulating value left in them. It was finally decided to discontinue the use of the 60 cycle voltage and to establish a routine test of 5 seconds application of the flashover voltage from the oscillator. This test will locate a very large percentage of the bad ones with an expenditure of a minimum amount of time.

We have observed that our regular suspension type insulators with a 10-inch disc require a voltage of about 80,000 to flash over.

From the records made while testing at the steam plant with both 60 cycles and oscillator we find that while testing with the oscillator first we examined 716 units, of which 187 bad units, or 26 per cent, were found with oscillator, after which 113 more bad units, or 15 per cent, were found with the 60 cycle test. While testing with 60 cycle first we examined 897 units, of which 361 units, or 37.8 per cent, were found to be bad, after which 123 more bad units, or 12.8 per cent, were found with the oscillator test. While this would indicate that the 60 cycle test was more effective, it must be borne in mind that the 60 cycle test was for a period of 30 seconds and the oscillator for only 15 seconds. Later, while in the neighborhood of control station, we examined 198 units first with 5 seconds 60 cycle test, finding 1 bad one, after which a 5-second oscillator test was applied to the same units, finding 24 bad ones, or 12 per cent. This result is quite different from the results obtained at the steam plant.

Again, while at the steam plant, we examined 983 units with the H. T. megger, finding 80 units, or 8 per cent to be bad. When these units were subjected to a combined test of the 60 cycles and oscillator, we found 48 per cent to be bad. Later, while at Inyokern we tested 357 units first with the megger, after which they were given the regular 5-second oscillator test. The megger showed them all to be good, but the oscillator found 206, or 57 per cent, to be bad. This result illustrates how inadequate the megger is for insulator testing. The insulators at the steam plant probably had sufficient moisture in them to permit the megger to give a reading, while the bad ones at Inyokern were so dry after a hot summer that they all measured "infinity."

To date we have examined a total of 47,989 units from the line, of which 12,439 units, or 26 per cent, have been found to be bad. So far the insulators have been found to be in the worst condition in the neighborhood of Inyokern, where we tested 471 units, of which 243, or 51 per cent, were bad. The insulators which have been in the best condition have come from the neighborhood of control station, from which in one week, we tested 1730 units, of which 158, or 9 per cent, were bad.

We have made observations to determine whether insulators coming from one arm were in any worse condition than those coming from another. The results obtained were as follows:

	No. Tested	No. Bad	% Bad
Top arm	242	42	17%
Middle arm	228	42	18%
Bottom arm	233	43	18%

The results were so close that they may safely be called alike from all arms.

We have also reviewed our records to determine if the position of the unit in the string had anything to do with its being bad. From the records of nearly 6000 bad ones, we have the following:

	No. Bad	% of Total
No. 1 (nearest arm)	863	14.8
No. 2	972	16.6
No. 3	1015	17.3
No. 4	971	16.6
No. 5	979	16.7
No. 6 (nearest conductor)	1034	17.7

Again we have observed that there is very little difference between dead-end and suspension towers as far as bad insulators are concerned. This is shown by the following:

Suspension Towers			Dead End Towers		
Tested	Bad	% Bad	Tested	Bad	% Bad
2407	520	21%	2417	453	18.7%

We have found that a great majority of the insulators fail through cracks in the head of the unit, break-downs occurring between the end of the pin and the inside of the iron cap. Only about 5 per cent of the failures have occurred through punctures outside of the iron cap. Most of these failures have occurred through original defects in the porcelain.

We have not found that failures have occurred any more frequently among insulators of dark than of light color, color being an indication of the extent of firing.

N. E. L. A. COMMERCIAL SESSION DISCUSSION

(The success of the California Co-operative Campaign, as recorded in the report of progress given at the meetings of the Commercial Section at the Del Monte conventions, was one of the most inspiring records of the gathering. The report of these sessions is here continued from the May 15th issue of the Journal of Electricity.—The Editor.)

ADDITIONAL DISCUSSION ON RETAIL SELLING PRACTICE

George B. Furniss, Pacific Gas & Electric Company, Oakland, Cal.: There is another form of advertising open to the small dealer through which the small dealer is playing an important part in the development of the electric business.

The small dealer can best advertise (and relatively at no expense) by making a house to house canvass of the territory in his district. This has particular reference to the small dealer in a town or in the outlying parts of a city. With a small stock of electric irons, he can leave one on a Friday or a Saturday for a few days over the ironing period. Likewise, a vacuum cleaner or toaster may be left; if the party has one or the other. We sometimes think that the market is saturated with these appliances. Nevertheless it is surprising how many homes are without these conveniences; conveniences which have become necessities. Where a sale is not made or a party is supplied, the dealer leaves his business card. The call gives a splendid opportunity for him to introduce himself and makes it easy for the householder to call at the place of business to make a purchase. When lamps, fuses, bell batter'es, the come-back trade of the electric business, are wanted, this party has the neighborly feeling which is natural and remembers him, especially when it is known that the same prices may be had as down-town. The small dealer can do the soliciting at odd times. If the dealer is large enough to have a clerk or handy man, it is good training to give him an opportunity to solicit. Personal contact with the people of the neighborhood is direct advertising.

PROBLEMS OF THE CONTRACTOR-DEALER

W. S. Berry, Western Electric Company, opened the discussion on J. M. Carlson's paper (p. 421) by stating that a careful investigation of a man's character and record is made by the jobbers before extending credit to him as a new contractor-dealer.

F. J. Somers of San Jose spoke for square treatment of customers by dealers.

D. E. Harris, Pacific States Electric Company, explained that credit is being extended to men who deserve it and that such men are encouraged to enter the business of electrical contracting and retailing in districts where the public is not now adequately and honestly served.

"BRICKS WITHOUT STRAW"

G. B. McLean abstracted the committee report entitled "Bricks Without Straw," laying particular stress upon the committee recommendation that selling data as published be codified, catalogued and indexed. After an extended discussion such action was cared for in a resolution submitted to the convention and subsequently passed.

ORGANIZATION OF THE INDUSTRY

T. E. Bibbins summarized his paper on "Needed: A Community of Interest," stating that the spirit of the convention already pointed to the fact that his message has been taken to heart.

Lee H. Newbert, as an example of actual co-ordination of effort, traced the development and accomplishment of the plan of the California Co-operative Electrical Selling Campaign. He believes that two years of work will bring forth most gratifying results to all participants. The complete report appears at the end of this discussion.

H. F. Jackson and **R. H. Ballard** participated in a discussion which finally led to framing a resolution extending the time of the campaign to June 30, 1919, this resolution being later adopted.

R. H. Ballard remarked that the proceedings of the convention had indicated the absolute necessity for co-operation of the electrical industry as a whole. He also developed the fact that in order that the fuel oil shortage may be met by the building of new hydro-electric plants, money must be raised not only through the government but from the public, especially consumers and employees. The success of such financing is dependent upon the public's realizing that the development and expansion of power companies is a war necessity.

Samuel Kahn pointed out that united action on the part of every branch of the industry is needed to meet the problems of finance and labor which now face us.

H. N. Sessions suggested the need for co-operation from and with the architect. The N. E. L. A. can be of such value to him as to warrant his joining, and the architect can be of such value to the N. E. L. A. as to warrant his being invited to participate in meetings.

C. F. Butte thought that Mr. Bibbins' paper might be better entitled: "Needed: A Community Ethically Educated." He suggested that every electrical activity should be put to the test "Is it ethical?" He questioned the ethics of charging operating expenses of a municipally owned utility to some other municipal department, of forbidding jitneys to parallel a municipal railway and allowing them to parallel a privately owned system, of a power company paralleling the sales effort of a dealer and charging the sales expense to another department, of a wholesaler doing a retailing business, or of a manufacturer competing with his wholesaler.

W. L. Goodwin then presented an explanation of his plan for national organization of the electrical industry, as has already been described in these columns.

REPORT OF PROGRESS ON CALIFORNIA CO-OPERATIVE ELECTRICAL SELLING CAMPAIGN

BY LEE H. NEWBERT

The committee is working to secure a suitable trade mark for the California Association of Electrical Contractors and Dealers. As soon as this trade mark is secured and adopted by the Contractors' Association, the newspaper space of the various central stations that has been offered to the campaign committee will be utilized to place the monogram, and the objects of quality service behind it, before the public throughout the state.

Mr. Newbert mentioned the objects of the campaign, particularly calling attention to that object of the campaign which the committee feels must be accomplished before much other work can be carried on successfully. This object is the bringing into closer relations and understanding the various individuals and companies in the industry, as mentioned in the commercial committee report published in the Journal of Electricity (page 423), and which has been published elsewhere in connection with the outline of the campaign work.

The report of the field man for the southern section of California which was presented to the Advisory Committee on May 8th, shows that the campaign work is bringing excellent results along this line. Mr. Newbert abstracted this report for the commercial session, emphasizing the following points:

The field man started in the southern section of the state about the last week in January, and dealers and central stations in all towns and cities except Los Angeles were called upon and acquainted in detail with the campaign. The field man secured on this trip information as to the exact conditions prevailing in all parts of the territory. A report of this work was given to the Advisory Committee at Fresno on February 28. At this meeting it was decided to hold a general get-together meeting at Los Angeles on March 15.

The field man spent the first two weeks in March in making arrangements, creating interest and securing attendance for this meeting. All the central stations, jobbers, manufacturers and principal dealers in Los Angeles were called upon, advised in detail of the meeting and impressed with its importance. The result was that the meeting was attended by two hundred and eighty of the leading electrical men in the southern section of the state, including central station officials, and contractors and dealers from one end of the territory to the other; the jobbers and manufacturers almost to a man.

The field men have found that the meeting has given valuable assistance to their efforts and recommend that in the future, at intervals of about six months, similar meetings should be held. There are specific cases where it has been reported by dealers that an appreciably improved co-operation on the part of the central station district agents has resulted from this meeting.

Since March 15th the field man has covered Los Angeles thoroughly and put forth a great deal of effort to increase the membership of the California Association of Electrical Contractors and Dealers in that section. The membership of the southern section of the Association before the drive started was 43. It is now 65, and there are still prospects whose applications will be secured. This work has not only strengthened the Contractor-Dealer organization, a move necessary for the campaign's greater success, but has developed their appreciation of the campaign's efforts to help them and this is demonstrated by their closer co-operation with the campaign.

The campaign has brought about a closer co-operation between all branches of the industry in southern California than there has ever been before. Everyone is beginning to realize that the electrical business is continually becoming a better business and that the campaign will do much to assist it in going forward with more rapid strides in the future than it has in the past. While the co-operation between the central station and contractor-dealers has improved since the start of the campaign, it is still far from what it should be. In covering the territory much effort has been put forth to correct wrong impressions and opinions that some of the dealers have had of central stations; cases were found where the dealer was of the opinion that the central station was doing things which either had not been their practice for months or even never had been done. The dealer in some cases had taken the word of his customer and had not taken the trouble to find out whether or not it was correct. One dealer had reduced his prices to meet those which his customers had told him the central station was charging. It was proven to this dealer that the central station had not made the prices claimed by the customers but was selling everything at regular list prices. Some dealers have blamed the central station and some central station men have blamed the dealers for doing certain things which each were justified in doing. When the position of the one is explained to the other an entirely different attitude usually results and many such cases have been cleared up since the start of the campaign. Both the dealers and the central stations are equally responsible for the conditions that have existed. There is but one solution to this problem and that is the dealers and the central station men must become better acquainted. To see that this is done is, in the committee's opinion, the most important work of the field men.

In covering the territory many suggestions in merchandising have been offered to the dealers by the field men, quite a number of which have been put into practice. Assistance has been given to the dealers in laying out their new stores and there are several dealers now looking for better locations, who, when these locations are secured, will call on us for suggestions. Also suggestions for re-arrangement of other stores have been offered. There is no limit to the amount of valuable assistance than can be rendered along these lines.

The committee handling the campaign feels very much encouraged over the results obtained to date and believe that those secured in the future will be far more encouraging. The southern section of California has now been thoroughly covered by the field man, every one is familiar with the campaign and its objects and we have reports showing the actual conditions existing in all parts of the territory. The future efforts of the field men in our committee should show very noticeable results.

Because the field man for the northern section of the state was secured nearly two months later than the man for the southern section, the work in the northern section has not progressed so far, but it is making progress along the same lines and on the same plan used in the south. The committee expects to soon be able to report equally satisfactory progress.

Our principal efforts from now on until satisfactory conditions are established will be to create more friendly relations between central station employees and contractor-dealers, as well as assisting contractor-dealers in merchandising. The condition that we have to overcome is not usually one of unfriendliness between central stations and contractor-dealers, but rather one of indifference. The men in one branch of the industry do not seem to understand that their success is dependent upon the sucess of all other branches, and that in all their plans they should take into account how these plans will affect companies and individuals in the other branches.

On account of the success of the get-together meeting in Los Angeles, a similar meeting has been planned by the committee to be held in San Francisco on Friday evening, June 7. At this meeting it is hoped that all representatives and employees of central stations and of contractor-dealers, jobbers, manufacturers and engineers, will attend. The committee promises a most interesting meeting.

WOMEN IN THE INDUSTRY

(The number of women employed in industry is increasing at a greater rate than the provisions made for their absorption. A new man employee is carefully instructed and broken in to the spirit of the organization he is to serve. Until we make similar provision for our women employees we are not giving them an equal chance to develop into the ideal worker which we are seeking. This inspiring record of what has been done along this line by a Southern California public utility company was one of the features of the Women's War Service Session of the recent Del Monte conventions. The author, as secretary to the president of the Southern California Edison Company, has had much to do with the development of the fine spirit of the women of her organization.—The Editor.)

WOMEN AND PUBLIC UTILITY EFFICIENCY

BY GERTRUDE TUCKER

A year ago there were barely fifty women in the Southern California Edison Company's service, and since that time, on account of the consolidation of the Pacific Light & Power Corporation and the draft, this number has been increased to two hundred and fifty. If the number of men under arms is multiplied by five or seven, as it seems must be, the result will be the increase of women employees in the same ratio.

After all, what are the limitations of the work of women in public utilities such as are represented at this meeting? In my own company, it has been thought heretofore that women were useful as stenographers, secretaries, telephone operators and in work of similar character, but beyond such work women were not to be considered. Today's conditions have entirely changed these opinions. As a matter of fact, with few exceptions, women can handle almost any class of work heretofore handled by men in the clerical force of the various offices, as contract clerks, cashiers, bookkeepers, collectors, sales clerks and even women meter readers are being seriously considered by some companies. It is not expected at the present time that women will work into the technical departments of the company, but there are possibilities for women of the future to take up engineering courses which will make their services valuable to corporations like ours.

"If there is any shadow of truth in the statement that the average woman in the office is not as good as the average man, it is because the women who are employed in offices have not had the incentive and education to qualify for the work they are expected to do."

If there are to be so many women employed in public utility companies in the future, then it certainly behooves companies employing them not only to make them comfortable, to care for their daily needs while attending to their duties, but also to plan for their education so that they may be better fitted to fill the positions which in the future women must fill. I have heard it said that the average woman in the office is not as good as the average man, because it is said she has not the ability to concentrate upon her work. If there is any shadow of truth in such a statement, it is because the women who are employed in offices have not had the incentive and education to qualify for the work they are expected to do.

Did you ever stop to think how much the average woman office assistant works in the dark? It is "Miss Jones, take a letter, please." "Will you get me such a letter from the file?" "What is Mr. Blank's telephone number?" with scarcely a word of explanation about the work of her own department and nothing at all of other departments. If it were not for her quick perception and intuition, she would be a total failure.

The men have had their district agents' meetings for the discussion of all phases of the company's business, and under the sponsorship of the National Electric Light Association, courses of education for salesmen, accountants, etc., but no one seemed to think of including the women in these, no doubt because of the small ratio of the women to the men.

In the Edison Company the men holding responsible positions, and those in training for such positions, have been persistently and constantly educated for many years past, and it is this education in all the niceties of the operation of the company's business and handling of its customers, that is responsible for what we call the Edison Spirit and the high standard of the company's employees. Now, if it has taken years to bring the men to the positions they have attained, how could it be expected that women could attain such proficiency and efficiency in a few months time, and if the women receive only half the training these men have received, they will be equal to filling any positions in which they may be placed.

I wonder if it is significant that the idea for the company's work among women employees grew out of a criticism of the personal appearance of some of the newer women employees. In defense, the statement was made that it was doubtless because they did not appreciate the dignity of working for a corporation of the high ideals ours possesses, and it was realized that in the confusion and busyness of consolidating two large organizations and working the women into the men's places, no one had taken the time to talk to them about Edison Spirit, about the company's history, what it stood for, and to explain to them the relation of their work to the work of the whole organization.

It is apparent to thinking women that there are certain descriptions of apparel which are suitable for the office, and other kinds suitable for the home, the theatre or elsewhere, and woman's usefulness may be increased if she is dressed in a manner suitable for her work. One woman of experience has given this advice to women in business: "Wear your best tailored clothes in the office instead of saving them for Sundays at home. You must impress your world, which is where you work, by your ability and success, and your clothes express you."

To meet the conditions in our company, a plan

was made for a series of meetings for women of the company, to give them an opportunity of becoming acquainted, and to learn and appreciate how much the company depends upon their loyal services. The first of these occasions was a luncheon, attended by 150 women, those of the general office and nearby districts, and by the company's officials, all of whom gave short talks. Mr. John B. Miller spoke on Edison Spirit and showed that it was a very real factor in the company's success. Mr. Brackenridge emphasized the interest of the company in the welfare of its women; Mr. Ballard spoke on cordial relations between officials and employees; Mr. Kemp told of the wonderful work of the women of Europe in sustaining the industries of their countries, and Mr. Kennedy explained the plan in detail, introducing the chief speaker of the afternoon, Mrs. Bertha A. Rich, a business woman who has gained success in two professions—advertising and magazine writing. Mrs. Rich's talk was an inspiration and an incentive to ambition, and as her hobby is personal appearance, she made some very telling points which were not lost on her audience, and the results of which were soon evident.

That was the first meeting. The general plan is to follow a kilowatt from its generation to its use by the consumer, and at the next meeting General Superintendent Pearson constructed upon the platform a working model of an hydro-electric plant, from the forebay to the lights on the poles. When the water was turned into the forebay, the wheels revolved and the lights shone. He explained in a simple, non-technical way the laws which govern the operation of the universe and showed by charts and demonstrations their application to the generation of electricity.

The next meeting came in the midst of the Liberty Loan Campaign and was on the subject of finance. Mr. Kemp, the comptroller, explained how money is raised to carry on the company's business, the different classes of stocks, bonds, etc., and how the money is spent. The assistant comptroller gave a most interesting resume of the chief events of the company's history, the development of its business, and its share in the development of Southern California.

Another very successful factor in bringing the women of the company together and teaching them to work as a unit, is the work of the Edison Auxiliary of the American Red Cross. Meetings are held twice a week for making surgical dressings, and an almost incredible number of these have been made. Knitted work is done in odd moments. The average is fifty garments a month, not a poor record for busy women who must do their patriotic work after eight hours in the office. In training the women to take the place of the men, we try to impress them with the fact that they are performing just as patriotic service as in the regular branches of war work.

We have material in our own organization for a very interesting series of talks, and it is my hope that the idea may be adopted by other companies in the Association, and that arrangement may be made for co-operation along the line of extending to the women associated with the public utilities every opportunity for gaining a complete knowledge and understanding of all phases of the work of the companies.

It certainly looks as if in these latter days, woman is coming into her own, but she cannot come into her full inheritance unless something is done to help her, and the individuals, companies and corporations using her services must do their share to train and educate the women associated with them. The women themselves must help each other, so they may be imbued with the right kind of ambition and incentive to self-improvement and inward desire to acquire the knowledge and information which will make them more useful and loyal to their employers and to themselves. Woman's possibilities today are greater than ever before in the history of the world.

"They speak about a woman's sphere
As though it had a limit.
There's not a place in earth or heaven,
There's not a task to mankind given,
There's not a blessing or a woe,
There's not a whisper, yes or no,
There's not a life, or death or birth,
There's not a featherweight of worth,
Without a woman in it."

STANDARDS FOR WOMEN WORKERS

The Woman's Committee of the Council of National Defense has recently adopted as its standards for women in industry those issued by the Ordnance Department of the Army. The "ordnance standards," as given in a Summary of Recommendations to Arsenal Commanders and Other Employers, provide:

1. **Hours of labor.**—Existing legal standards should be rigidly maintained, and even where the law permits a 9 or 10 hour day, efforts should be made to restrict the work of women to 8 hours.

2. **Prohibition of night work.**—The employment of women on night shifts should be avoided as a necessary protection, morally and physically.

3. **Rest periods.**—No woman should be employed for a longer period than four and a half hours without a break for a meal, and a recess of 10 minutes should be allowed in the middle of each working period.

4. **Time for meals.**—At least 30 minutes should be allowed for a meal, and this time should be lengthened to 45 minutes or an hour if working day exceeds 8 hours.

5. **Place for meals.**—Meals should not be eaten in the workrooms.

6. **Saturday half holidays.**—The Saturday half holiday should be considered an absolute essential for women under all conditions.

7. **Seats.**—For women who sit at their work, seats with backs should be provided, unless the occupation renders this impossible. For women who stand at work, seats should be available and their use permitted at regular intervals.

8. **Lifting weights.**—No woman should be required to lift repeatedly more than 25 pounds in any single load.

9. **Replacement of men by women.**—When it is necessary to employ women on work hitherto done by men, care should be taken to make sure that the task is adapted to the strength of women. The standards of wages hitherto prevailing for men in the process should not be lowered where women render equivalent service. The hours of women engaged in such processes should, of course, not be longer than those formerly worked by men.

10. **Tenement-house work.**—No work shall be given out to be done in rooms used for living purposes or in rooms directly connected with living rooms.

CURRENT RATE FIXING PROBLEMS

BY C. E. GRUNSKY

(The problem of fixing the value of a water right is one of the most perplexed which confronts the valuation expert. Extremely varied opinions have been expressed by engineers and courts — indeed, there has been very little clear thinking on the subject. The following article, therefore, which is one of a series considering the water right from a logical standpoint, is not only of extreme interest but of great timely value. The author is well known as an engineer and valuation expert.—The Editor.)

IS THE VALUE OF A WATER RIGHT ASCERTAINABLE BY COMPARISON

When water is used for irrigation it makes the intense cultivation of the soil possible. It aids, as stated in the preceding article, in producing crops which can be marketed at prices not subject to regulation except by the law of supply and demand. The availability and use of the irrigation water modify the character and increase the amount and consequently the value of the crop. These elements may thus add an increment of value to the irrigated land. Under such use, the value of the water at the field and, upon allowance for the cost of development, its value at its source can be determined. Water and water rights in districts where water is used for irrigation acquire, in consequence, a recognized market value, depending upon the resulting appreciation of the land, upon the value of the crops harvested in relation to the cost of production, and upon the cost of developing and making available the irrigation water.

When water is taken from a stream for uses which decrease or otherwise modify the natural flow of the stream or when works are constructed which raise or lower the water plane of the stream the rights of riparian owners may thereby be affected. Contemplated diversion can not be made nor can proposed works be constructed in such cases, without making compensation to the riparian owners for the resulting damage to their property, except of course when such owners sleep upon their rights.

To the extent of the cost of extinguishing the riparian rights and possibly of securing other water rights whose use is secondary or which for any reason should be merged in one holding, there is then—a public utility being under consideration—an investment to be assumed in that intangible element—the water right.

Sometimes by reason of local development and high values of riparian lands and the use of the stream flow for power, the cost of settling with the riparian owners and of eliminating adverse users of the water may be large. At other times the situation is such that equally good rights to use water can be secured without any cost except the cost incident to the construction of the project features and the acquisition of the necessary lands and rights of way.

The fact that in the first case it will have to be conceded that the owner of the public utility is entitled to have the cost of the water right which he holds made a part of the rate-base and that at least to the extent of cost (reasonable and actual proper cost being assumed) this water right has or should be made to have value, justifies the public in concluding that the other water right which has cost nothing should have a similar value whether the same be made a part of the rate-base or not. Water rights applying to water whose use is demanded by society, are then to be regarded as having market value. When the water is developed and is in use or is available for use or when the need of putting the water to beneficial use is proximate, the existence of such value is easily recognized. When an investment has been necessary to eliminate adverse rights and to meet other expense of securing the water right, the propriety of including its cost in the rate-base is unquestioned.

According to the decision of the U. S. Supreme Court in the case of San Joaquin and Kings River Canal and Irrigation Company v. the County of Stanislaus, California, the water right must receive the same consideration as other property when rates are to be fixed. But the court does not attempt to settle the question of how a water right is to be valued.

The right to appropriate flowing water and to put the same to beneficial use is given by law, in most of the Western states, to any one who will construct proper works for the development of the water and for its transmission to places of use. The water of the stream is reserved to the public. The grant of the right to take water from a stream and put it to some beneficial use is comparable with a franchise. This right may have value for the same reason that a franchise or other intangible element of property may have value, that is because the exercise of this right may result in net earnings creating value in excess of the investment in physical property. Whether the market value of the water right, or the investment that was made to secure it, is to be made a part of the rate-base will depend upon whether value or the investment is to be made the starting point when rates are to be fixed.

The courts and the rate fixing authorities, accepting the view of the public, but still generally adhering to the fiction that fair value is the basis of the calculation, not only hold that water rights may have value but that they should appear at their market value in the rate base. But neither the courts, nor public service commissions, nor valuation experts, have yet discovered any dependable method of determining this market value.

Regional Cost of Development Considered

The method of estimating the market value of a water right in the case of water used to supply the needs of an urban population, by comparison with the ordinary or average cost of developing water in the same region in like amount, of like quality and under similar conditions of delivery, has occasionally been applied, but not with satisfactory results.

To illustrate, let it be assumed that the average ordinary cost of supplying water for domestic use in the region in which a water right is to be valued is 10 cents per 1000 gallons. This amount is here supposed to include interest on the investment and cost of opera-

tion. Let it be further assumed that the cost of supplying by the system whose water right is to be valued has been found to be 9 cents per 1000 gallons. A comparison of these costs of supplying water indicates that the value of the water right under appraisal is ascertainable by the capitalization of 1 cent per 1000 gallons. It will readily be seen that under such circumstances a rise of 10 per cent or 1 cent per 1000 gallons in the average regional cost of water production would have the absurd effect of doubling the value of the water right.

Furthermore, in the case of every ascertainment of average regional cost those properties which are least favorably circumstanced must fall above the average to offset those which fall below. The former may nevertheless be entitled to the same standard of treatment as is accorded to the latter. And yet, under this test of value, all of those whose cost of developing their supplies exceeds the average, would have to consider their water rights liabilities and not assets. This is an absurdity and condemns the method.

Neither this method nor a comparison with the cost of developing the next most available supply can be used as a dependable method for determining water right value.

In some sections of the country, as for example in certain portions of California, the demand for irrigation water has nearly if not quite reached the limit of supply. In such regions the depressing effect upon the value of water rights which results from large undeveloped available sources is no longer felt. The earnings that result from the use of the water are large and have become the measure of value and this value is consequently relatively high.

The value of water rights in such sections has an effect upon the value of water rights elsewhere and for uses other than irrigation. The value of water used for domestic purposes, domestic use being imperative, should not be less than that of water used in the same locality for irrigation and if for this purpose it has a high value in one part of the state—the question is asked—why not in another? Such considerations as these are not without effect upon the market value of water rights.

To the extent that the value of a water right as taken into the rate-base other than the natural rate-base of a public service property exceeds the cost of the water right, the owner is conceded a profit or reward for undertaking the development, and this profit or compensation increment might reasonably be expected to bear some definite relation to the general cost of developing water in any region.

The practice of thus making a reasonable allowance for water right value, preferably a percentage allowance on the ordinary regional cost of developing water resources, has not yet been anywhere established, but in the writer's judgment would have merit. If this practice were generally adopted, it would result in fixing with some definiteness the value of water at its source and would remove much of the uncertainty that now obtains in relation to the value of water rights. Moreover, if thus determined, the value of the water right would not be subject to unreasonable fluctuation nor to too wide a range. Where the regional cost of development, including everything necessary to make the water available for distribution is 10 cents per 1000 gallons and the allowance for water rights is to be about 10 per cent of this amount, or 1 cent per 1000 gallons, a departure of 1 per cent in the cost of water development from this regional average would only modify the value of the water at the source by 0.1 per cent. A 10 per cent departure would be necessary to affect this value by 1 per cent. In other words, when once an amount has been agreed upon and generally accepted as a proper allowance to be made for the value of the water right or rather, when such value is to be created by a suitable allowance of earnings, this value will be fairly stable and being then readily ascertainable, will thereafter when definitely recognized by the public, pass as the market value.

Strategic Value

But in addition to the basic value at its source, a water supply may have additional value due to an established market and an inherent advantage of quality and location and to other circumstances that determine its development cost in comparison with the development cost of competing supplies. Such value may be termed "strategic value."

To illustrate, a riparian ownership which controls a water power may be cited. The case may readily be conceived of such a water power, limited in amount, which is completely controlled by a riparian owner. When such a source of power is to be valued in a region where the market for power is good, where, for example, the water power will be delivered to a market in which it displaces a like amount of power generated by steam, the cost of the latter in comparison with the cost of the former, affords a legitimate means of determining value or, better stated, ordinarily an upper limit of value. The valuation becomes a simple matter when, under such circumstances the power is already fully developed and is in use or is being supplied to a market which takes it all. But when the market for power is undeveloped, some consideration must be given to the uncertainty of achieving the expected results and due allowance must be made for the time that will have to elapse before a return from the sale of power can be realized.

There will, of course, be cases in which an analysis of the cost of generating and delivering power will show the advantage to be with the power developed by steam. This may obtain when from any cause, such as an irregular water supply, the load factor on the hydro-electric plant is unfavorable or when the cost of water development and transmission of power to the place of use is materially higher than it would be from a properly located steam plant. In such cases the hydro-electric enterprise may nevertheless be a legitimate one. It may have been initiated when the price of fuel for generating steam was such that the advantage of cost was temporarily with the water power; or the margin in favor of the steam power may be so small that the recognized advantage and economic value to society in conserving the energy which annually reappears in the water of the stream outweighs any financial disadvantage that may appear from a comparison with steam as a source of power, and justifies earnings that might not under other circumstances be considered reasonable.

RECENT ADVANCES IN WESTERN WATER LAW

BY A. E. CHANDLER

(Upon the wisdom and farsightedness of water laws and their interpretation by the courts depends in large measure the development of our Western country. The cases herein commented upon illustrate a determined effort on the part of courts to decide in behalf of positive development and beneficial use of our water resources. The author is president of the California State Water Commission.—The Editor.)

GOING CONCERN VALUE AND WATER RIGHTS OF WATER COMPANIES

Denver v. Denver Union Water Co., 38 Supreme Court Reporter, 278

In this case the Denver Union Water Company sought a restraining order in the Federal courts against the enforcement of an ordinance of the City of Denver passed March 3, 1914, fixing water rates, upon the ground that such rates did not afford a fair and reasonable compensation. The contention of the company was upheld by a special master and the District Court, and the matter went on appeal directly to the United States Supreme Court.

The principal points raised in the appeal are the allowances for "going concern value" and water rights.

In upholding the allowance for going concern value, the Supreme Court said:

"With respect to the former item, we adhere to what was said in Des Moines Gas Co. v. Des Moines, 238 U. S. 153, 165, 35 Sup. Ct. 811, 815 (59 L. Ed. 1244):

" 'That there is an element of value in an assembled and established plant, doing business and earning money, over one not thus advanced, is self-evident. This element of value is a property right, and should be considered in determining the value of the property, upon which the owner has a right to make a fair return when the same is privately owned although dedicated to public use.' "

The amount allowed by the master for water rights was $1,998,117. There are a number of decisions of the Supreme Court of Colorado holding that water rights belong to the consumer, and not to the company. There is one comparatively recent decision by the same court seeming to hold to the contrary, and it was upon this that the company relied. In referring to the two sets of decisions, the Supreme Court concluded that, as the question is one of such great consequence, and not free from difficulty, it ought not to be passed upon unless the exigencies of the case require it. Deducting the amount allowed by the master for water rights, the valuation of the company's plant as fixed by the master is $11,417,782. The net return is found to be only 4.28 per cent of such value. The court directly said that it had "no hesitation in holding that the return yielded by the ordinance now before us is clearly inadequate, and amounts to a taking of complainant's property without due process of law. * * *"

This case illustrates how the decisions of the Supreme Court of a state must be weighed by the United States Supreme Court in passing upon a specific case. In San Joaquin & Kings River Canal and Irrigation Co. v. Stanislaus County, 233 U. S. 454, the United States Supreme Court held that the water rights belong to the company, and therefore should be valued with the other property of the company in estimating the return to be allowed. The California Supreme Court had not directly passed upon this point, and the Supreme Court of the United States was therefore not bound by any precedent.

TAKING OF PRIVATE PROPERTY FOR PRIVATE USE PROHIBITED

Gravelly Ford Canal Co. v. Pope & Talbot Land Co., 26 Cal. Appl. Decs., 593

The Gravelly Ford Company brought an action to condemn a right of way for a canal over the property of the Pope company. The canal was intended to irrigate lands exclusively held by Miller & Lux. The right to condemn rested upon the provisions of a California statute approved May 1, 1911 (1911 California Statutes, 1407). The lower court held that the statute gave a right to a company to condemn for the exclusive irrigation of its own lands, but the Court of Appeal interpreted the act to give the right of condemnation to those only who are engaged in public service and, therefore, reversed the judgment. The following paragraph from the opinion is of decided interest in that it indicates that the court will be guided by the will of the legislature where a statute clearly provides for the right of an individual to condemn for private use:

"It is obvious that the question hinges on the meaning of the terms public use. To sustain respondent's contention and to find support for the judgment, we must hold that these terms mean 'public advantage' and not 'use by the public'; our courts of review must about face and join with those courts that have held the terms to mean anything which tends to enlarge the resources, increase the industrial energies, and promote the production power of any considerable number of inhabitants of a section of the state, or which tends to the growth of towns and the creation of new resources for the employment of capital and labor, or contributes to the general welfare. In the absence of unequivocal statutory direction, we are unwilling to sanction a construction of the terms public use, found in the act of 1911, which would be so radical a departure from the construction uniformly given them where elsewhere found in the constitution and laws of the state."

RIGHT OF RIPARIAN OWNER TO RESTRAIN PUBLIC SERVICE CORPORATION

Habermann et al. v. Ellensburg Gas & Water Co.—Wash.—170 Pac. 571

Holmes v. Snow Mountain Water & Power Co., 26 Cal. Appl. Decs. 457

J. M. Howell Co. et al. v. Corning Irr. Co. et al.—Cal. —171 Pac. 100

In the state of Washington, a riparian owner may enjoin one storing or diverting water at a point on the stream above him, which storage or diversion will result in injury to him—provided that the one storing or diverting above is not engaged in public service. The Habermann case illustrates the exception to the general rule.

Habermann and others were lower riparian owners, and attempted to enjoin the Ellensburg Gas & Water Company, which company had expended a large amount of money in changing its place of diversion from a lower point on the stream to one above the lands of plaintiffs. The Supreme Court of Washington held that the company might have maintained eminent domain proceedings, and have acquired whatever rights the plaintiffs had to the waters of the stream. It did not do so, but expended money in construction work, and supplied the city of Ellensburg with the water so diverted. It was therefore held that the plaintiffs were not entitled to an injunction, and that, if they had any remedy, it is an action for damages.

Holmes Case.—In this case Holmes, a riparian owner below the dam of the power company on Eel River, asks that the company be enjoined from continuing to divert the waters of Eel River and also asks damages in the sum of $5000. Holmes owns land on both sides of Eel River about 200 feet below the dam. The bluffs of the river on his land are from 40 to 60 feet high. The land is broken and while part of it has been cultivated to crops and part of it is irrigable, no water has been diverted from Eel River for use upon the land. In his brief, Holmes abandons any right to either damages or an injunction by reason of the diversion of the flood waters of the stream, which limits the case to the ten cubic feet per second flow during the summer months.

The decree of the lower court gave Holmes two cubic feet per second, leaving to the power company the right to impound and divert the remaining eight of the ten second feet. The lower court further found that the two cubic feet per second allowed Holmes are ample for all his purposes and that no damage would result to Holmes by the diversion of the remaining eight by the power company.

The Court of Appeals upheld the lower court in the following words:

"Under the facts of this case no injury could be done plaintiff by the diversion of that portion of the water of this stream which he could not possibly use, leaving to him a sufficient flow of the stream for all his possible present and future needs. (Miller v. Bay Cities Water Co., 157 Cal. 256; Cohen v. Le Canada W. Co., 151 Cal. 680; San Joaquin v. Fresno Flume Co., 158 Cal. 626; Stratton v. Mt. Hermon etc., 216 Mass. 83.)"

The court held as a further reason why no injunction should issue that Holmes and his predecessors had waited four years after the public use began before action was initiated, and that his right to an injunction is, therefore, barred by this intervening of the public interest.

Howell Case—In the Howell Co. case, the Corning Irrigation Company sought to bring itself within the above rule. Although the Supreme Court of California stated that the rule applied where companies were engaged in public service, it was shown that the Corning Company was a mutual water company, devoting the water which it diverts exclusively to the use of its own stockholders, and not to the general public. It was, therefore, held that the company cannot be considered as engaged in public service, and is not entitled to the relief prayed for.

RIPARIAN RIGHT DOES NOT ATTACH TO "FOREIGN WATERS"

E. Clemens Horst Company v. New Blue Point Mining Co., 55 Cal. Dec. 440

The Horst Company and other plaintiffs are the owners of land riparian to Bear River. The New Blue Point Mining Company has been diverting the waters from Wolf Creek, a tributary of Bear River, through an old mining ditch which crosses the divide into the watershed of the Yuba River. Part of the waters flowing in Wolf Creek and diverted by the Blue Point Co. are so-called "foreign waters" made up of sewage from the city of Grass Valley and water discharged from mines and mills, all of which water was originally diverted from the Yuba River. In the words of the Supreme Court, "The principal question involved in this appeal is the following: Where the flow of a natural stream is augmented by artificial means, that is by waters which, without the intervention of human agency, would never reach the stream, does this artificial flow inure to the benefit of riparian owners or is it merely in the nature of abandoned personalty which may be appropriated by the first person who can take it from the stream?" In reaching its conclusion that the riparian right does not attach to "foreign waters," the court expressed an attitude which is noteworthy:

"So jealous have the courts of this state been for economy in the use of water and the fair apportionment of the precious fluid for beneficial purposes that they have refused to restrain the diversion of water by a non-riparian appropriator, at the suit of a lower riparian owner, when the amount diverted would not be used by the latter but would greatly benefit the person diverting it. (San Joaquin and Kings River Canal and Irrigation Co. v. Fresno Flume and Irrigation Company, 158 Cal. 626; Modoc Land and Live Stock Co. v. Booth, 102 Cal. 151; Fifield v. Spring Valley Water Works, 130 Cal. 552.)"

As the opinion fixes a very definite limitation to riparian ownership, it should be gratefully received by all those who believe that only through the doctrine of prior appropriation can the fullest development of our water resources be consummated. As there are certain expressions in the opinion which at least would give a good basis to an argument that the court in this opinion meant also to lay down the rule that the doctrine of prior appropriation does not attach to "foreign water," the State Water Commission requested a modification of the opinion. In denying the petition of the other plaintiffs for a rehearing, the court answered the request of the State Water Commission as follows:

"The court does not construe the opinion herein as deciding the question as to what rights may be acquired in so-called 'foreign waters' as between appropriators, or by prescription. The record in these cases presents a controversy between the plaintiffs claiming the waters in question solely by virtue of their lower riparian ownership of the banks of Bear River of which Wolf Creek is a tributary, and the defendants claiming the right to divert the foreign waters of Wolf Creek by virtue of their appropriation and application of the same to beneficial uses." (55 Cal. Dec. 612.)

The above paragraph very clearly shows that the rule laid down in the opinion is restricted solely to the rights of riparian owners in "foreign waters." In former decisions of the California Supreme Court, the right of prior appropriators to "foreign waters" has been upheld. There is no reason to believe that the Supreme Court will change the doctrine.

BUSINESS BUILDING
SELLING IDEAS
DISPLAY

WITH THE ELECTRICAL CONTRACTOR AND DEALER

CONSTRUCTION KINKS
COST KEEPING
ESTIMATING

LIGHTING CITY PARKS IN PORTLAND

BY F. D. WEBER

(This article on the lighting of parks and boulevards is of interest—not only to the contractor in the larger cities, where park lighting forms a most conspicuous part of the summer illumination problem, but also in the smaller towns, where plans are being developed for the improvement of the lighting systems. Practical and attractive standards and ingenious underground connections mark the Portland installation.—The Editor.)

Laurelhurst Park—note the comfort station at the right in which the substation is housed.

FOR several years Portland, Oregon, has been systematically following out a system of installing a standardized type of lighting standard in its parks and along some of the boulevards.

The standards are of concrete, octagonal in cross-section and 12 feet in height. The base is 2 feet square on a foundation set 4 feet in the ground. The diameter at the top of the standard is 5½ inches. A 1½-inch pipe in the center carries both cables, which are passed through a waterproof joint just below the top. A No. 8 solid copper wire is joined to each of the stranded cables at the terminals for making connections in the lamp socket. The poles were cast in vertical forms with the small end down, as it was thus possible to use for the first 2 feet at the top of the pole a mixture of one part cement to two parts of sand, while the regular one-two-four mix was used for the remainder of the pole. After erection, the standards were finished with a neat cement wash.

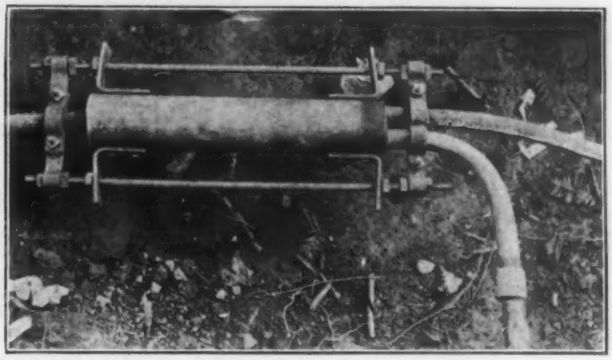
About three and one-half miles of the boulevard system known as the Terwilliger Boulevard was installed with 91 standards spaced 150 feet apart.

The cost of the installation (1914) was $12,300. Each pole complete in place cost about $135, including its share of the distributing line and transforming equipment. The cost of the base concrete poles was approximately $30 each.

A constant — current series — lighting system is used. Energy is taken from the city distributing mains on 2300 volt lines to the transformers, and goes out at 2600 volts single-phase on double steel taped No. 8 stranded cable. The wiring arrangement is such that eight 2075 foot lengths of this cable were used without splices, all connections being made in the terminals within the standards into which the main cable itself is looped. The current is carried in the distributing lines at 6.6 amp, and a single 400 candle power tungsten lamp is used on each standard in a 20 inch globe.

It was arranged that approximately 100 standards could be served by each transformer set.

Comfort stations are used to house the tub transformers and other substation apparatus. They are constructed both of wood and cement and consist of four



Special device for keeping strain off joints in soft ground where splice is made at base of standard—Terwilliger Boulevard, Portland

rooms—one for tools, two for toilets, and one for the substation, the size of the substation room being 6 feet by 8 feet.

The electrical contractors installing the steel cable, which was placed in a trench, encountered several conditions where it was necessary to overcome them by devising special apparatus. In many places rubber covered wire had to be spliced to steel taped

Special clamps for "Y" connection in soft ground where rubber covered wire was spliced to steel cable — Terwilliger Boulevard, Portland.

cable in soft ground. The accompanying photograph shows the special clamp for a "Y" connection. Also another device is shown, which was used to take the

Lighting System in Laurelhurst Park, Portland

strain off joints in soft ground. The picture shows the splice necessary to be made at the base of a standard. The conduit runs from here to the standard.

COMMENT ON THE GOODWIN PLAN FROM THE NORTHWEST

BY FORRESTER E. SMITH

(The National Association of Electrical Contractors and Dealers stands for something very vital to the interests of even the isolated contractor-dealer in a country town. It means that through his local organization he may affect national policies which would otherwise be formed without regard to his interests. This plea for the Goodwin Plan is of special interest, coming from a man prominent in contractor-dealer affairs who attended the recent meeting of the national organization as alternate for the Washington state chairman.—The Editor.)

We have as local and state organizations been trying to get conditions with regard to central stations, purchasing lamp situations, etc., which can only be brought about nationally. In order to get the things we are after we must have a strong national organization made up of strong local, state and divisional organizations, all working to the same end and tied together with firm bonds. Our interests must not be divided. In a recent article in Collier's, Von Hindenberg is credited with saying, "We must divide men in their interests first of all. After that it is child's play to divide their territory and possessions." Up to a short time ago the National Association had about fourteen hundred contractor-dealer members—this out of some twenty-five thousand in the entire nation. The attention of the contractors in smaller towns is called to the fact that they would be unheard of if their Commercial Club comprised three or four business men out of fifty or sixty in their town.

The biggest thing about the new National Association is that its future plans contemplate organization of the entire electrical industry. When all interests realize that they must get together to put over the Electric Idea, central stations, wholesalers, contractor-dealers, engineers and manufacturers will find it necessary to get a broader vision of the electrical industry.

One of the things that has held organizations of contractor-dealers back is the fear on the part of the so-called big contractors that they might in some meeting, let some precious pearls of wisdom drop and "educate" some so-called small contractor. I have adopted a new term as follows, "a contractor who does a large business," not a "big" contractor. The writer is also struck with the number of "Electrical Engineer" signs on contractor-dealers' store fronts. I wish it were consistent for them to have "Electrical Sales Engineer" also on their store fronts, billheads, and stationery of all kinds. I think that it is the greatest need we have in the contractor-dealer game today. It has been my pleasure to attend meetings of loggers, lumbermen, manufacturers, sign shops, and whatnot, and the greatest need has always been salesmanship. If the Goodwin plan is not adopted by some of the states now holding back, they will be in the position of the crap-shooting nigger in the story.

It seems that Gus wanted to borrow a dollar from Rastus. Rastus protested that he was shooting his last dollar. He shot and lost and slyly picked another bill from his hatband. Again he shot and lost and remembered he had another dollar in his shirt pocket. Again he lost, and as he reached in the inside of his belt, Gus said: "Just keep on shootin', just keep on shootin', nigger; them bones will make you tell the truth yet."

ORGANIZING THE INDUSTRY

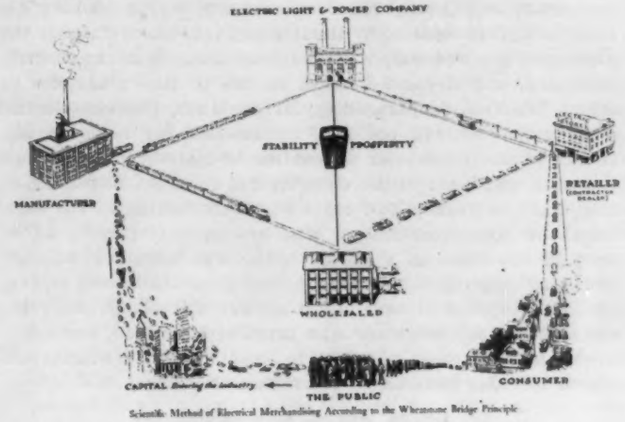
BY W. L. GOODWIN

(For the first time, in the past few weeks, the West has had the opportunity of hearing of the Goodwin Plan at first hand. Although the idea was one which was really developed on the Pacific Coast, before being carried East by its originator, the recent visit of W. L. Goodwin has brought out many new features and advantages. In view of the great interest shown, a brief explanation of the 'Bridge" which is the symbol of the plan, is here given in Mr. Goodwin's own words.—The Editor.)

The Wheatstone Bridge furnishes an excellent analogy of the method of scientific merchandising in the electrical industry.

The battery, the source of energy, represents the public whose investors furnish the capital for all branches of the industry. This capital, the manufac-

turer, converts into generating and distributing equipment for the central station or industrial, or into appliances and supplies. His sales diverge as shown in



The Wheatstone Bridge of the electrical industry

the diagram, dependent upon the principal class of product utilized by each branch.

The central station has electric service as its principal product which, it will be noted, is used through the wiring installed principally by the contractor-dealer.

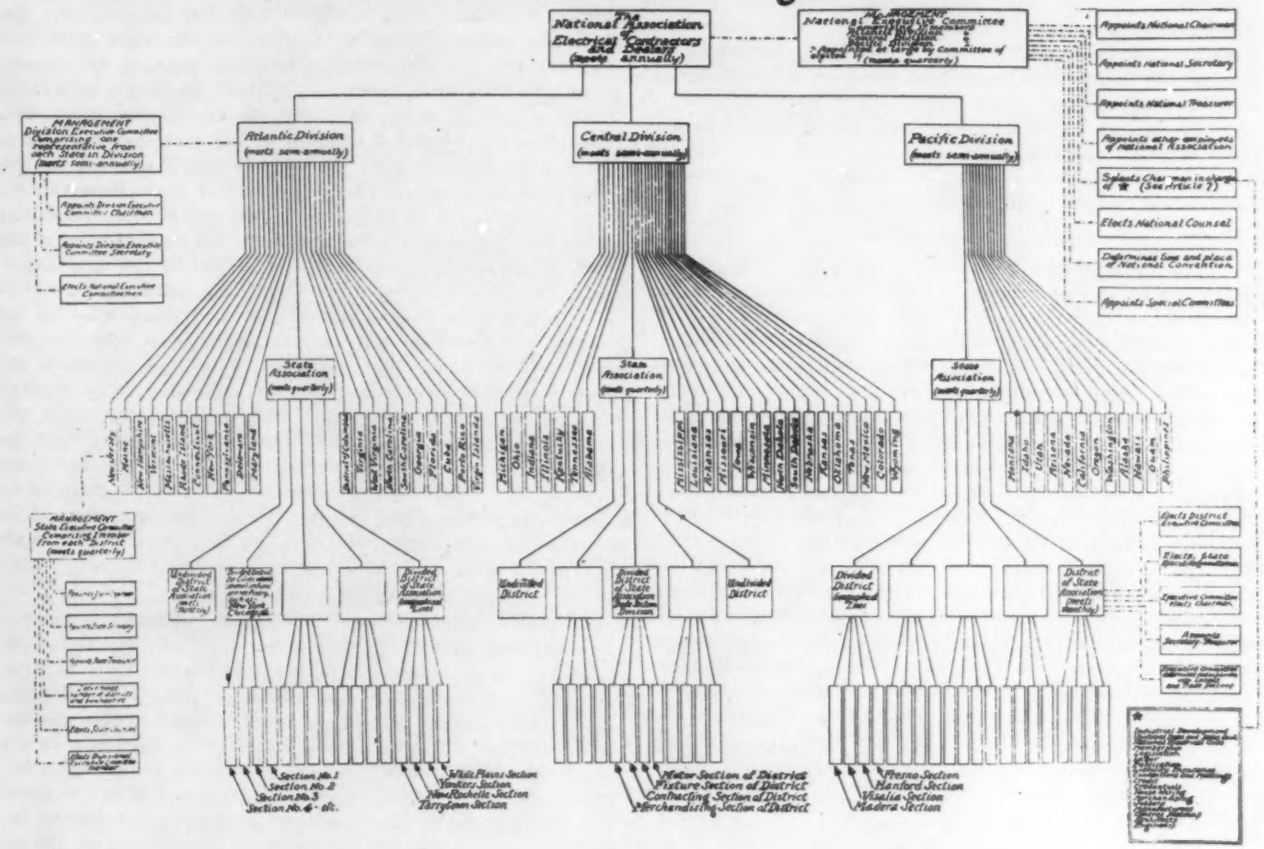
The wholesaler has as his principal function problems affecting wholesale electrical merchandising. He makes contact with the central station or the contractor-dealer in passing to the consumer.

The contractor-dealer thus becomes the point of retail contact of the manufacturer, central station, and wholesaler with the consuming public which, by the way, following the circuit, brings us back to the negative side of the battery, thus completing the analogy.

Nothing in the diagram indicates, nor is it the intention to restrain in any form, either of the interests referred to in performing the function of another, but due regard to the interests of all should be recognized in order that the scientific plan of merchandising under the Wheatstone Bridge principle will not indicate on the galvanometer an unbalanced condition which now exists.

When each interest operates with a due regard to the interests of the others the galvanometer will indicate at zero, an evidence of a balanced condition which when applied to electrical merchandising and the electrical industry, is reflected as stability and prosperity.

National Association of Electrical Contractors and Dealers
Graphic Representation of Organization



THE ELECTRIC SIGN BUSINESS AND THE GOODWIN PLAN

A LETTER TO THE EDITOR

SAN FRANCISCO, May 2, 1918.

To the Editor, Journal of Electricity, San Francisco.

Those of us who were fortunate enough to hear Mr. W. L. Goodwin's inspiring and helpful address at the recent meeting of the San Francisco Electrical Development League left the meeting, not only thankful to Mr. Goodwin for the work he is doing, but with minds turned introspectively to the problems of the group in which he belongs, wondering what its place in the sun will be when Mr. Goodwin's Utopia arrives.

The Place of the Sign Business in the Industry

The electric sign branch is not difficult to place in the new ideal scheme of planning the functions of the industry as outlined by Mr. Goodwin. But there have been many instances of a misunderstanding concerning it. It is hoped you will open your columns to this letter, which presents a few of the problems of our business as it concerns the other branches of the industry, with the belief that this publicity will help to clear the air and assist in solving the problems outlined.

The electric sign business of the states west of the Colorado-Utah line is conducted by eleven manufacturers who sell about $750,000 a year combined. The largest concern contributes slightly less than one-third to the total, the others grading off to concerns with a volume as small as $20,000. The electric sign business will never be a large factor, but it will always be with us and it deserves support from all branches of the industry, not only because it is a member of the electrical family, but because of its money contribution to the other branches of the industry. A census of the electric signs in use in the West produced by one manufacturer alone shows that about 1,000,000 lamp sockets, each requiring periodic lamp renewals to the benefit of the lamp and contracting branches, not to mention the daily revenue to the central station or the contractor's labor and material involved in running services to these signs.

The writer believes he voices the sentiments of each of these manufacturers in the following statements, as they are nothing more than what all of us in the business recognize and discuss frankly when we meet.

Selling Through the Retailer

The electric sign manufacturer takes his place in the Goodwin plan as a manufacturer and not as a contractor. The nature of the business requires that he sell direct to the consumer instead of through wholesaler-retailer channels. Right here is where trouble begins, as some wholesalers and retailers believe there should be a price differential sufficient to protect each one and they say the electric sign concerns are not dealing along "regular lines." But the big wholesalers and the clear thinking contractor-dealers do not say this because they appreciate the difficulty of asking a manufacturer for a price differential on an article of merchandise that from its nature cannot be stocked and that requires a totally different type of salesmanship from anything else in their line. The hard truth is that no wholesaler or contractor-dealer has ever made a success merchandising electric signs, and that recently three members of the Pacific Coast Electric Supply Jobbers Association, who operated electric sign manufacturing plants in connection with their own business and marketed the product through their contractor-dealer trade, have discontinued the practice, thus ending the final remaining examples of a condition existing years ago when many wholesalers, contractors, billboard plants, and even central stations, manufactured electric signs.

Commissions to Dealers

Thus, one problem of the electric sign company is to know what to do with the contractor-dealer who writes in saying he has a prospect for an electric sign. There is not one case in a thousand where the contractor can make the sale of the sign without the assistance of the direct representative of the sign company and still fewer times does the contractor-dealer care to handle the account. Shall the contractor-dealer be paid a commission for turning in the lead? If not—what will justify his continued activity in looking for electric sign prospects? Without going into the details of the argument pro and con, it is the best thought of the electric sign men, and it can be stated as one of the "principles of ethics," as so aptly phrased by Mr. Goodwin, that the electric sign companies will not give commission for leads or discounts to the wholesaler or contractor-dealers; but the sign company will leave to the contractor-dealers the furnishing of lamps and the running of service and connecting of the sign. To those contractor-dealers who are so enterprising as to send in the name of a prospect, the sign company will not look for competitive bids on lamps and service wiring or suggest to the prospect that he do so, but will accept the price estimate of the contractor who furnished the lead, leaving it to the latter's good judgment to keep the price within reason to increase the chance of making the sale.

Correcting Unfavorable Ordinances

Electric sign companies need help from all other branches in the attempt to straighten out the tangles in local electric sign ordinances. The central station branch can be of distinct help in this. It would surprise your readers to know the list of western towns that an electric sign salesman can hardly enter due to some kink in the local ordinance. The writer will not list these because we consider it a direct reflection on the local central station manager that such a condition exists. The electric sign business welcomes intelligent regulation, but it is up to the local central station manager who is in touch with local politics to see that his town has a "workable" sign ordinance. For instance, one well known California town, a county seat, has an ordinance limiting the height of electric signs above the walk to 12 feet. But the town is full of board awnings installed by an ordinance limiting their height to 13 feet, so under an awning there is but 12 inches of space for an electric sign. This condition has persisted in spite of the fact that most large cities have a height limit of 10 feet, which if adopted for this California town, would admit of 3 feet of space beneath awnings suitable for electric signs. Another medium sized city changed its electrical ordinance years ago so that most of the "old work" would be condemned if judged by the new inspection. But the department of electricity ruled that the "old work" was permitted to remain provided there were no additions. A merchant buys a sign believing it will cost him only $25 or $30 to erect and connect it. Yet, although the electric sign service is not made on extension of an existing circuit, but is in conduit clear back to the meter board, the department of electricity rules that it is "new work" and before he can run his sign service his entire premises must be rewired. Conditions such as these cannot be changed by the efforts of an outside electric sign company except at an expense too great to contemplate, yet the central station manager could bring it about quickly and easily, if he only would.

Handling Small Town Trade

How to reach the small town trade profitably is another problem the electric sign men are trying to solve. It is comparatively easy to sell electric signs in the multitude of prosperous small towns, but that which happens after the sign gets on the ground determines profit or loss. Unfortunately in the territory of those central stations who believe they are operating on the Goodwin plan it has mostly been loss so far. This is due to the central station's mistaken idea of the Goodwin plan and not to the plan itself, as nobody can believe the Goodwin plan contemplates injury to any branch of the industry. To illustrate, a sign was sold in a small town with the erection and connection cost estimated by the salesman as usually must be the case, since a sign prospect is closed by impulse and will grow cold if a definite figure is not given

him immediately when ready to buy. The sign was shipped and the local contractor-dealer was told to go to the freight office and look over the sign and bid on the cost of erecting it, running service, and connecting. When the bill came in it was for a sum three times his bid with the explanation that as "all necessary material was not sent with the sign as claimed, so the extra labor and material ran pretty heavy." What he had done was to discard the hanging rig sent with the sign and build one of his own. He had no "falls" or block and tackle and had hoisted the sign into place by building a scaffold under it and blocking it up inch by inch. He had blacksmith bills, etc., all neatly shown to prove his claims. Now here is not a case of a contractor purposely overcharging. He did actually put in the work charged for, but due to unfamiliarity with sign hanging, his cost was excessive.

Now, in the old days, the central station did the erecting and its construction man being familiar with handling transformers on top of poles, etc., could put up the sign in half a day. It is claimed by the electric sign companies that this condition must return and the work of the electrical contractor restricted to running the service, etc. This seems a small matter, but it is vital to the success of the electric sign business in the small town. If the central stations will not take over the work of getting the sign up on the face of the building, letting the contractor-dealer run the service, the industry will be forced to refrain from going into the small towns where such conditions exist.

Co-operation

From this as a first step, the central station can then go on as it may desire to other forms of co-operation such as collecting term payments, assisting to finance the term payments, installing a patrol service to turn sign on and off at stated hours, etc. But many central stations refuse even the first step, stating they are leaving all merchandising to the dealers, etc. Such an attitude is not co-operation. It is strangulation.

The things referred to herein seem reasonable and simple of accomplishment, but it is these simple things that are difficult to bring about nevertheless, and it is hoped the publicity you have accorded this letter will assist the formation of correct policies toward the electric sign business by central station, wholesaler and retailer.

Yours very truly.

T. W. SIMPSON,

Western District Manager Federal Sign System (Electric).

"TYING IN" WITH NATIONAL ADVERTISING

BY W. F. BRAINERD

(A chance for real co-operation which will mean better business for both contractor-dealer and manufacturer is here pointed out by the northern California representative of the California Electrical Co-operative Campaign.—The Editor.)

Possibly one of the biggest helps the dealer gets in the sale of his goods is the national advertising, appealing to the consumer carried by the electrical manufacturers. These ads cost a big amount of money, but they pay or they would not continue to appear year after year.

As the magazines are circulated in every city in the United States that is large enough to support an electrical dealer, it is safe to assume that some readers

Some of the national advertising appearing in leading magazines, of which the contractor-dealer should take advantage

in every town are more or less interested. The dealer's problem then is to get these more or less interested prospects into his store.

Many dealers watch this national advertising closely and feature the nationally advertised article in their local advertising. In addition to the newspaper advertising, they make window displays. To make the connection between the window display and the magazine advertising, they paste on the window the page of the magazine containing the ad. One live dealer even goes so far as to refer in his local ads and window cards to "OUR ad in the Saturday Evening Post this week." He has the proper idea. It is his ad or the ad of any dealer that wants to take advantage of it, as the manufacturer can not get one cent return on his advertising investment until the dealer has first made his sale and taken his profit.

Technical Hints

BY GEORGE A. SCHNEIDER

ELECTRIC FANS—THEIR SELECTION AND INSTALLATION

(The proper selection and installation of fans is one of the greatest safeguards of the electrical dealer for a prosperous summer trade. The questions of just where to locate the fan and what type and number are needed for a given space and purpose are the first problems of a customer—or of an electrical man himself making the installation. These matters are here considered from a practical standpoint by the manager of the Buffalo office of the Western Electric Company.—The Editor.)

Few, if any, of the so-called popular electrical devices afford more genuine comfort in the summer than fans. The fan in summer is comparable to the heating system in winter. They are required in the home for the health and comfort, in the industrial establishment for efficiency and comfort and in the store and public place for increased patronage and comfort.

Fortunately, the very best of modern electric fans can be had in a large variety of sizes and types at prices which are low enough to keep them out of the luxury class. This is of course made possible by the wonderful modern manufacturing methods which have contributed so much in countless ways to the comfort and progress of humanity. Not only are the first costs reasonable, but the operating costs as well are extremely low. Further, with reasonable care these fans will last through many seasons and give many hundreds of hours of satisfactory service.

Types of Fans

Fans depending upon their application are generally divided into two classes. First, those which are designed simply to remove vitiated air and are commonly known as ventilating or exhaust fans. Second, fans which do not exhaust but stir up or agitate the air or serve to aid in directing the air currents in a desired direction.

Exhaust and ventilating fans are made in two general types. The smaller sizes—12 and 16 inch—are usually modified forms of standard non-oscillating fans mounted in a sutiable supporting ring. These are commonly known as ventilating fans and are intended for use where the air passages are entirely open. The other types—commonly called exhaust fans—are made in sizes ranging from 12 to 60 inches, inclusive, and are intended for use where larger volumes of air are to be handled and where the openings are likely to be somewhat obstructed; for example, in connection with piping leading from the ventilating hood over a range to the outside of a building. These fans have specially designed blades to make them more suitable for this service than the ordinary fan blade and, further, have a larger number of blades or individual wings so they may handle a large volume of air and still be operated at a lower speed to reduce noise.

There are, however, many types of agitator or buzz fans, as they are sometimes called, in the market, each being designed for some particular application or service. The differences in design are largely due to the methods of mounting. Thus, there are ordinary desk and bracket fans, ceiling, floor and counter column fans, telephone booth fans and several other types. The desk and bracket fans are further made in both stationary and oscillating types and the ceiling and column fans may be of the gyrating type.

Standardization

During the past few years the various manufacturers of fan motors have been endeavoring to standardize the various types and sizes. Much has been accomplished along this line, but there is still further progress to be made in the future. Not only are the fans being standardized but attention is being given to the methods of packing, the length of cord to be furnished, the kind of attachment plugs to be used, and several similar important questions. Further, nomenclature applying to fans is also receiving attention. For example, the old term "desk and bracket" formerly applied to certain types of fan motors, has been superseded by the term "non-oscillating" since practically all fans which can be used as desk fans are also suitable for bracket service.

Full information on the various types, sizes and kinds of fans now available in the market can be obtained from the manufacturers' catalogues, so the remainder of this article will be devoted to the selection and installation of fans. Further, only matters relating to the agitator fan will be discussed. However, it is well at this time to note briefly the difference between exhaust and agitator fans and their function, because this question comes up so frequently during this season of the year, and so many purchasers — and many dealers, too—do not realize the distinction that should be made between these two different types of apparatus.

Function of Exhaust and Agitator Fans

An exhaust fan is not intended for cooling the air but, as stated in a foregoing paragraph, solely for removing impure or vitiated air which the normal ventilating air currents do not remove with sufficient rapidity to keep the air pure and prevent stuffiness. No cooling effect will be obtained by the installation of an exhaust fan unless the air flowing in to replace that removed by the fan is cooler than the air replaced.

On the contrary, desk and ceiling fans are intended to produce a sensation of coolness. They will not prove of value in removing vitiated air, or changing the air in a room unless placed near an opening so the air currents are directed out of the room. Even

under these conditions they will actually remove the air only to a limited extent.

The cooling effect is due to the evaporation of moisture from the surface of the body. During this process heat is drawn from the body, thus effecting an actual reduction in temperature. These fans simply set in motion air currents, which if close to the body will bring fresh dry air in contact with the skin and greatly assist evaporation, thus producing the sensation of coolness.

Principles of Selection

No fixed rule for the selection of fans can be given. In restaurants, stores, show rooms, offices, factories and public places of a similar character the arrangement of the interior will usually determine the type of fan which should be used. The size of the rooms will in turn determine the size of fans and number required. In general, non-oscillating fans are used for long narrow rooms and where there is no objection to a steady breeze in one direction. Where several fans are used they should be pointed to direct the air currents in the same general direction. Oscillating fans are most suitable for comparatively wide rooms. To secure the best results the center of oscillation should be pointed across the room. Oscillating fans are a considerable improvement on the stationary or non-oscillating fan, since they distribute the breeze over a larger area by swinging from side to side, and are therefore more economical to use for large areas than a fan throwing a breeze in a fixed direction. Ceiling and column fans are suitable for large interiors or where the wall space is taken up by shelves or other fixtures and when no columns are available for mounting bracket fans.

The distribution of air from standard paddle blade ceiling fans is not very satisfactory because the air is thrown downward over a rather limited area, generally not much larger than one and one-half times the diameter of the blades. The breeze outside of this area results from the re-direction of the air currents as they strike the floor, counters, tables or other surfaces within this area.

Gyrating fans give a greater distribution of air and less direct draft than ceiling fans. In fact, the distribution of air from this type of fan is ideal. For this reason they are rapidly becoming very popular.

As a general guide in selecting sizes and locations of fans, especially for large areas, the following table arranged by one of the large manufacturers of fans, will be found useful:

GUIDE FOR SELECTION OF FANS

Distance from Wall to Wall	Non-Oscillating Fans	Oscillating Fan	Distance Apart when Fans Are Placed in a Row
Up to 12 feet....	8-inch	10 to 12-inch	15 feet
12 to 15 feet.....	10 to 12 inch	12-inch	20 feet
15 to 20 feet	12-inch	16-inch	25 feet
20 to 30 feet	16-inch		30 feet
Larger	32-inch Ceiling Fan		20 feet
	56-inch Ceiling Fan		40 feet
	Gyrating Fans		25 feet

Positions of Mounting

Fans mounted along walls should be placed on opposite walls, but preferably not directly opposite each other, so that all parts of the room will receive a movement of air. The spacings shown in the last column to the right in the table indicate the distance apart on each wall.

For interiors of not more than 30 feet in width, the 32-inch ceiling fan will give good results. For large areas, two rows of 32-inch or a single row of 56-inch fans will be required. In either case the spacings between fans shown in the table should be observed. Gyrating fans will cover about the same area as a 56-inch ceiling fan, but it is better to space them a little nearer to each other as shown in the table.

Where ceilings are too high for mounting ceiling fans or where they would be otherwise objectionable on account of the appearance or construction of the ceiling, counter or floor column fans may be used to good advantage. These may be of the ordinary paddle type or of the gyrating type, both being on the market. These fans will give satisfactory results when mounted from 30 to 40 feet apart. The blades of either ceiling or column fans should not be less than 8½ feet above the floor and in some cases a greater distance will be advisable.

Fans in the Home

For the home the choice is limited to a lesser number of types. The most popular seems to be the 12-inch 6-blade residence fan. This fan operates at a slower speed and makes less noise than a 4-blade high speed fan of the same size, but at the same time moves practically the same volume of air. This fan can be had in both oscillating and non-oscillating types, but the former is probably best for general service because of the wider distribution of breeze.

A large number of 6 and 8-inch fans are also used in the home and have proven quite satisfactory for small homes. However, in purchasing fans of these sizes and especially the smaller, one should select a fan built along the same general lines and with the same care as larger sizes of fans. Many of these 6-inch fans are really little more than toys and have a limited life, due to their poor construction.

The best place to put a fan in the home is generally on an open window sill to draw in the fresh air, except where there is only one window in a room, when the fan should be mounted on the opposite side of the room to blow toward this window. This will assist the natural circulation of air. In any case care should be taken not to allow the strong currents of air to be directed continuously against a person as this will probably result in developing slight colds or muscular soreness. Special caution regarding this point is advisable when fans are used in sleeping rooms.

Other Uses

Agitator fans are valuable for many purposes other than producing comfort by reason of better air circulation. A very important one for which the ceiling fan is of recognized value is to create a draft to drive away flies and insects from the street door of a store or away from eatables within the store. For this purpose the smaller ceiling fan usually from 32 to 36 inches in diameter, but operating at higher speeds than the larger ceiling fans, give the best results and at the same time are small enough to fit into almost any doorway.

Lack of space prevents a discussion of fans and their uses for various classes of service except in a general way. However, in later issues several additional articles on this subject will appear in this department.

WHAT WESTERN INVENTORS ARE DOING

BY WM. K. WHITE AND H. G. PROST

(The importance of a precise statement of the claims in the application for a patent is brought out in the important mining case now before the courts. The principles involved are of the greatest interest and well illustrate what might be urged as parellel contentions in the case of your electric patent. The authors are prominent patent attorneys of the firm of White & Prost, San Francisco.—The Editor.)

MINERALS SEPARATION, LTD., DECISION

In the case of Minerals Separation Ltd., plaintiff-appellee vs. Butte & Superior Mining Co., defendant-appellant, brought for the infringement of the Sulman, Picard and Ballot patent for an ore concentration process, the Circuit Court of Appeals for the Ninth Circuit, on May 13, 1918, rendered its decision reversing the lower court and ordering the suit dismissed.

This suit has attracted attention throughout the country on account of the immense sums at stake and the effect of the decision therein on the mining industry.

The patent, in suit, covers a process of concentrating ores, which consists in mixing the powdered ore with water, adding a small proportion of an oily liquid having a preferential affinity for metalliferous matter, agitating the mixture until the oil-coated mineral matter forms a froth, and separating the froth from the remainder by flotation.

Some of the claims of the patent are expressly limited to the use of oil "amounting to a fraction of 1 per cent on the ore."

Claims 9, 10 and 11 specify the use of "a small quantity of oil," and, therefore, are not limited to "a fraction of 1 per cent," as are the other claims.

In the case against James M. Hyde, the Supreme Court, on December 11, 1916, adjudged the "small quantity" claims void but held valid the "fraction of 1 per cent" claims.

In the Butte & Superior Mining Co. case, Judges Ross and Hunt rendered opinions to the effect that the claims, containing the words "amounting to a fraction of 1 per cent on the ore," were limited to the use of oil not exceeding one-half of 1 per cent on the ore. As the defendant had never used, in its process, oil in a quantity as small as one-half of 1 per cent, the Court adjudged it had not infringed and ordered the suit dismissed.

Judge Morrow filed a dissenting opinion in respect to the finding that the "fraction of 1 per cent" claims were limited to a fraction of "one-half" of 1 per cent, or a lesser fraction. In his opinion, Judge Morrow said:

"I am of opinion that the use of an oil or oily liquid in defendant's separation process in a quantity not 'amounting to more than a fraction of 1 per cent on the ore' is within the express terms of claims 1, 2, 3 and 12 of plaintiff's patent, and is an infringement of such patent. But I am of opinion that the use of oil or oily liquid in a quantity amounting to more than a fraction of 1 per cent on the ore is not within the terms of claims 1, 2, 3 and 12 and is therefore not an infringement upon plaintiff's process and that a decree should be entered accordingly."

The determination of the question of infringement depended, primarily, upon the construction and interpretation to be placed upon the Supreme Court opinion in the Hyde case.

Plaintiff contended said opinion should be construed as finding and contemplating the existence of the following facts:

1st. That plaintiff's patented process differed from prior art processes, in respect to its "mode of operation," resulting in the production of a mineral bearing froth differing substantially from prior art froths.

2nd. That this new "mode of operation" was due, not alone to the small percentage of oil used, but also to the character of oil used.

3rd. That the patent gives an example of the kind of oil to be used, to wit: oleic acid.

4th. That oleic acid is a "frothing" oil, capable of producing the kind of froth necessary to the success of the process and characterizing its mode of operation.

5th. That the patent claims cover, not only oleic acid, but all equivalent oils, that is, all oils having such froth making capacity.

6th. That the claims, in specifying the percentage of oil to be used, refer, by necessary implication, back to the particular oil mentioned in the specification and to equivalent oils, to wit: frothing oils; and do not refer to, include or take into account non-frothing oils.

Plaintiff also contended that defendant used only a fraction of 1 per cent of frothing oil and, therefore, infringed the patent, notwithstanding it used, in addition to such frothing oil, a non-frothing oil which brought the total amount of oil used up to 1 per cent or more on the ore. Plaintiff contended such non-frothing oil did not change the mode of operation of the patented process, nor the character of froth produced, nor the valuable results attained thereby; that it was a non-functioning liquid that had no more effect on the process than so much milk or any other non-functioning liquid that might be added.

Plaintiff also contended that the Supreme Court did not find the "small quantity" claims void merely by reason of the fact that they were not limited to the use of a "fraction of 1 per cent" of oil, because such a finding would be tantamount to holding the invention resided merely in reducing the quantity of oil used, which would be inconsistent with the general rule of law that a mere change in degree, quantity, size, proportions, etc., generally does not amount to patentable invention.

Plaintiff, therefore, urged that the "small quantity" claims were held void merely because they were not limited to the results attained, that is, were not limited to the "new mode of operation" characterized by and due to the use of frothing oil in "a fraction of 1 per cent on the ore."

The defendant's contentions were:

1. That the patented invention resided "merely" and "only" in the reduction of the amount of oil used in prior art processes.

2. That the patent claims refer to all kinds of oil and should not be construed as referring only to oleic acid or equivalent oils, to wit: frothing oils.

3. That the Supreme Court found that the invention resided in using not more than one-half of 1 per cent, or lesser fraction, of oil on the ore, and that, therefore, the claims, specifying a fraction of 1 per cent, must be construed as covering only the use of one-half of 1 per cent, or lesser fraction.

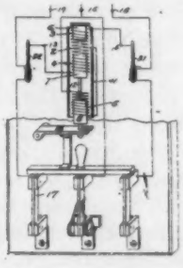
4. That defendant always used more than one-half of 1 per cent of oil and, therefore, did not infringe, although it admittedly used less than one-half of 1 per cent of a frothing oil, to wit: pine oil, which constituted a portion of the total amount of oil used by the defendant.

The Court of Appeals' decision will probably be reviewed by the Supreme Court and, until a decision is rendered by that tribunal, the mining world will remain in doubt as to just what scope will finally be accorded the claims of this much-litigated patent.

NEW IDEAS FROM THE WEST

Alternating Current Solenoid

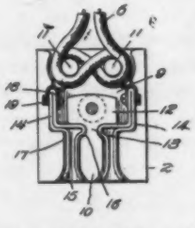
Patent No. 1,259,202, issued to Sydney N. Baruch of San Francisco and assigned to the Baruch Electric Controller Corporation, discloses a novel form of alternating current solenoid. The object of this invention is to provide a polyphase solenoid in which the tractive efforts of all of the phases are exerted in one line and in which the pull on the cord remains substantially constant during the period of an alternation.



The solenoid of this invention consists of a plurality of solenoid sections connected to different phases of the polyphase circuit arranged in axial alignment and separated so that interfering fluxes are avoided. The solenoid is formed of coil sections arranged on a single axis and spaced apart from each other and preferably consists of two coils, one coil section being wound over to superposed on the other.

Electric Attachment Plug

Patent No. 1,259,609, issued to Harry W. Denhard of San Francisco and assigned to the Cutler-Hammer Manufacturing Co., shows an improved form of electric attachment plug. This plug consists of a two-part insulating base having recesses in the adjacent faces into which contact clips are set



and in which the clips are held without being fastened. Each base part is also provided with two spaced studs around which the line conductors are wound so that they take the strain which is placed on the cord.

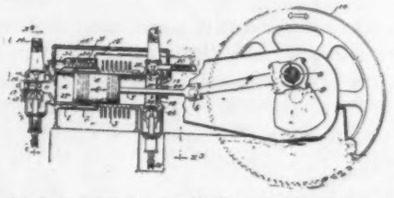
Submarine Cable

Patent No. 1,259,344, issued to Edwin W. Beardsley of San Francisco and Philip W. Ham of Oakland, shows a new form of submarine cable for the transmission of electric cur-

rents. This cable is composed of a central metallic supporting cable covered with insulation and spirally wrapped around the supporting cable are a plurality of insulated electric conductors. Surrounding the insulating conductors is a lead sheath which provides a water-tight case and steel armored wires are spirally wrapped around the lead sheath, the joints between the armored wires being covered. The function of the steel armored wires is to act conjointly with the central metallic supporting cable to relieve the electric conductors of any strain.

Apparatus for Producing Power

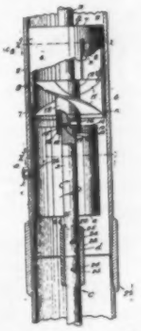
Patent No. 1,258,713, issued to David H. Smalley of South Pasadena, Cal., discloses a novel form of internal combustion



engine in which power is applied to both ends of the piston. This engine comprises a cylinder having a piston movable therein. A combustible charge is introduced into the cylinder behind the piston and a charge of air is introduced into the cylinder in front of the piston. The combustible charge is ignited, driving the piston forward and compressing the air in the other end of the cylinder, and means are provided for transferring some of the heat of combustion to the air so that the pressure of the air is increased and operates to drive the piston back.

Rotary Runner Pump

Patent No. 1,259,124, issued to James R. Palmer and Fenn H. Palmer of Los Angeles, discloses a new form of rotary runner pump. This pump is designed to be installed



in the well casing and includes a shaft on which is mounted a rotatable propeller for forcing the liquid up through the casing. Introduced between the casing and the propeller is a cylindrical sleeve having a smooth internal surface to reduce friction of the liquid at that point. The sleeve is spaced from the casing and is rotatable with the propeller and is provided with tangential slits so that a supply of the liquid can pass through the sleeve and produce a pressure between the sleeve and the casing.

SPARKS—Current Facts, Figures and Fancy

(Electric fans in India, electric kitchens in England, electric lights and telephones in Russia and China, and electric drills and ranges at home, mark the spread of the electrical era. An interesting safety first contest inaugurated by a Western power company which places the emphasis on good health as well as accident prevention, offers food for thought.—The Editor.)

A new means to meet the present labor shortage is found in the good health competition which has been started by a Western power company as a war measure among its employees. This is coupled with an accident prevention contest, illness to be counted against the power plants entered just as an accident.

* * *

A case where a piece of insulated 14-gage copper wire was completely gnawed in two by rats was reported recently. The wire fed a fixture hung from a hollow beam which formed a part of the false ceiling in a confectionery store. Rats had entered the hollow beam and gnawed at the wire. When the light went out, wiremen made this unusual discovery.

* * *

The largest reinforced concrete building in the world is reported from St. Louis. It has one 26-foot story below ground and six stories above ground. There were over 81,000 cubic yards of concrete used, and 121,560 barrels of cement, with more than 6,700 tons of steel. The ground area is 117,000 square feet, and the floor area over a million square feet.

* * *

Even Greenland has its newspapers. For many years, for example, there has been printed in Eskimo a newspaper with the tongue-twisting title of Atuagagdlintit, which, being interpreted, is "Something for Reading." One odd feature of the paper is that there is little personal news, and names, those of natives at least, are rarely printed, as it is held to be unlucky.

* * *

The part played by electric drills in the game of war is shown by the computation that 70 drilled holes are required in every three-inch shrapnel shell, in every rifle 90, machine gun 350, torpedo 3466, war plane 4089, war truck 5946, war ambulance 1500, three-inch field gun 1280, gun caisson 594, and anti-aircraft gun 1200.

* * *

National kitchens have been established in various communities in England where community cooking is done at nominal prices in the interests of economy, both of foodstuffs and fuel. Of three such in one city, one is fitted for operation with gas and two for operation with electricity. The electricity Committee is to provide the electric cooking apparatus at the same price as the apparatus in the gas kitchen, and will maintain the two electric kitchens at the same price per kitchen as the gas kitchen.

* * *

Says the bank report of the exportation of electric fans: "Of nearly half a million dollars worth of electric fans exported in 1917 the largest market was in India where the boy operator of the 'punkah' (a swinging fan suspended from the ceiling) holds the world's record for somnolence, while Hong Kong, the Straits Settlements, China, Japan and even Siam show a disposition to substitute the new fangled but always reliable breeze producer for the uncertain methods of earlier generations."

* * *

An electrical man recently returned from Russia reports that Petrograd and Moscow have as many telephones per 100 inhabitants as Paris, Vienna and Budapest, and that, in spite of high rates, poor service and limited toll facilities. The seven leading towns in Russia are as well telephoned as a similar number of large towns in France, Austria, Hungary, and twice as well as Italian towns. When a Russian municipality places an order for an electric light plant, it usually is forced to order an extension before the original plant is installed, being overwhelmed by applicants.

* * *

When the housewife starts a coal fire to cook a meal her coal efficiency is about 2 per cent—that is, in one ton of coal burned 40 pounds of it have gone into the bread she baked, the cereal she cooked, or the washing she did; and 1960 pounds of the coal have gone up the flue, or radiated from the top and sides of the stove, contributing greatly to her discomfort, saying nothing of the waste of labor incurred by her shoveling 1960 pounds of coal into the stove and cleaning out and carrying away 200 to 500 pounds of ashes. The moral is—use an electric range.

* * *

The native gentry of Tungchow are going to form a company for the installation of electric light in that city, while Paoting natives are also about to do the same. This shows that electrical business in China will be greatly improved as the natives in the interior cities begin to appreciate the value of electric lighting instead of the candles or oil lamps they are accustomed to. The Tokio government is giving financial subsidies to a Japanese company for the unification and improvement of Japanese electrical enterprises in China, so as to compete with Western merchants upon the termination of the war.

* * *

Hydroplanes are to be used in facilitating American trade with Siberia. Notices are appearing in Russian newspapers telling of the 1918 expedition of the Siberian Steamship, Manufacturing & Trading Company from the United States to the mouths of the Ob and Yenisei rivers. This will be the seventh annual expedition to Siberia undertaken by the concern in question by way of the Kara Sea. For the first time hydro-airplanes will be used this year to point out ice-free waters.

PERSONALS

Samuel Kahn, vice-president and general manager of the Western States Gas & Electric Company, with headquarters at Stockton, Cal., has been elected president of the Pacific Coast Section, N. E. L. A. The two preceding terms of presidency have been most ably filled by R. H. Ballard, vice-president of the Southern California Edison Company, and H. F. Jackson, president and general manager of the Sierra and San Francisco Power Co. Mr. Kahn received his technical education at Purdue University during the time when that institution produced so many noted engineers in embryo. Since graduation he has for years proved himself an able executive in helping to build up the remarkably strong esprit de corps so well recognized in the Byllesby organization, of which his present company is a subsidiary. A year of strenuous activity is ahead for the Pacific Coast Section, N. E. L. A., and it is confidently expected on all sides that Mr. Kahn will carry the now widely acknowledged effective work of this section to even higher planes of usefulnesss.

F. N. Huddleston, chief assistant city engineer of Salt Lake City, Utah, has recently resigned.

A. L. Bradley, chief electrician with the Hammond Lumber Company, has returned to Eureka, Calif., from San Francisco.

R. J. Davis of the Century Electric Company left recently for the East, where he will visit the home establishment of his company at St. Louis.

Marion S. Barnes has returned to San Francisco from Schenectady and will be located in the San Francisco office of the General Electric Company.

H. H. Thedinga, representative of Garland-Affolter Engineering Co. at Seattle, has returned from a visit to the company's main offices at San Francisco.

J. C. Rockwell has been promoted from manager of the light and power department to general manager of the Manila, P. I., Electric Railroad & Light Company.

H. G. Cloud has resigned his position with the Pacific States Electric Company in Oakland to become an instructor in the aviation school at the University of California.

T. H. Jordan, electrical salesman with the Pacific Power & Light Company at Yakima, has resigned and accepted a position with the Brokaw-Eden Washing Machine Company.

H. C. Mahaffey, formerly plant superintendent with the Pacific Power & Light Company at Lewiston, has been transferred to Walla Walla as superintendent of the plant there.

A. L. Harris, formerly industrial engineer with the Pacific Gas & Electric Company, has opened offices as consulting industrial engineer in the Hobart Building San Francisco.

W. H. Brown, general manager of the Red River Power Company at Grand Forks, N. D., was a member of the general committee in charge of the Liberty Loan campaign at Grand Forks.

C. L. Jacklett, formerly district manager at Prosser with the Pacific Power & Light Company, has been appointed district manager at Toppenish, vice **G. I. Drennan,** who is on leave of absence.

H. A. Lemmon, of the Truckee River General Electric Company of Reno, and food administrator for Nevada, has been spending some days in San Francisco on business connected with his government work.

First Lieut. W. D. Mel, formerly with Pacific Gas & Electric Company in San Francisco, has returned from Fort Monroe, where he has been stationed, and is now at the Presidio.

G. L. Oman, Northwestern manager of the Pacific States Electric Company, made a hurried trip to California recently, owing to the death of his father in Sacramento. He remained in California for a few days.

Marion Bunnell, niece of Albert H. Elliot, secretary of the Pacific Division of the National Electrical Supply Jobbers Association, has joined the electrical sales force of the Baker-Joslyn Company in San Francisco.

G. W. Milliken, resident manager of the La Junta division of the Arkansas Valley Railway, Light & Power Company, La Junta, Colo., was county chairman of Otero county for the Third Liberty Loan campaign.

Frank D. Fagan, western sales manager of the Edison Lamp Division of the General Electric Company, has been newly elected to the position of director on the board of the Home Industry League of California.

H. F. Albright, vice-president and general superintendent of the Western Electric Company, recently made a quick trip to Japan. He sailed in the middle of March and was scheduled to return about this time to Hawthorne.

J. T. Urquhart, formerly district manager of the Pacific Power & Light Company at Vancouver, Wash., has resigned to go into private business, and **W. D. Myers,** formerly district manager at Hood River, is transferred to Vancouver.

H. H. Griffiths has joined the selling organization of the Electric Railway and Manufacturers' Supply Company at San Francisco as lamp specialist, bringing to the work the results of his wide experience with Eastern lamp manufacturers.

H. I. Markham, general manager of the Federal Sign System (Electric), with headquarters in Chicago, is now visiting cities of the Pacific Coast states in company with **Tracy W. Simpson** of San Francisco, western sales manager for the company.

Captain Richard L. Smith of the Engineer Reserve Corps was able to obtain sufficient leave from his duties to attend the banquet at the Del Monte Conventions on Friday evening. As Captain Smith was formerly associated with the Southern California Edison Company, he received a tremendous ovation upon entering the banquet hall.

W. H. Merrill, president of Underwriters' Laboratories, Chicago, has been appointed Section Committee Chairman of the newly organized Fire Prevention Section of the War Industries Board of the Council of National Defense. Mr. Merrill is now in Washington to assume the duties of the new position for the period of the war. State fire marshals, municipal five prevention bureaus, insurance boards, bureaus, associations, companies — in fact all existing fire prevention organizations — are being enlisted by the Section in a co-operative effort to avoid interference of the government's program through fires in munition plants and government establishments. Mr. Merrill brings to the Fire Prevention Section the experience in fire prevention engineering gained during a period of 25 years of active participation in nation-wide fire prevention work. He started as an electrical inspector in Boston and Chicago and later worked out the idea and organization of Underwriters' Laboratories established and now maintained for service—not profit—by the National Board of Fire Underwriters. The steady growth and valued service of the Laboratories demonstrates the executive ability which Mr. Merrill brings to the new Section created to aid in winning the war.

Arthur R. Kelly, a well known consulting valuation engineer with headquarters at San Francisco, was an interested attendant at the Del Monte convention sessions.

W. A. Thompson has resigned as general agent for the Federal Sign System (Electric) at San Francisco and Oakland to become Northwestern district manager for the Novelty Electric Sign Company, making his headquarters at Boise, Idaho.

W. E. Jones, western representative of the Economy Fuse & Manufacturing Company, with headquarters at Seattle, has returned again to the Northwest after a profitable visit in California cities, including the sessions of the convention at Del Monte.

D. E. Harris, vice-president of the Pacific States Electric Company, and **H. E. Sanderson,** western manager of the Bryant Electric Company, with headquarters at San Francisco, have gone East to attend the Jobbers' convention at Hot Springs, Va., and are to spend some time in the East.

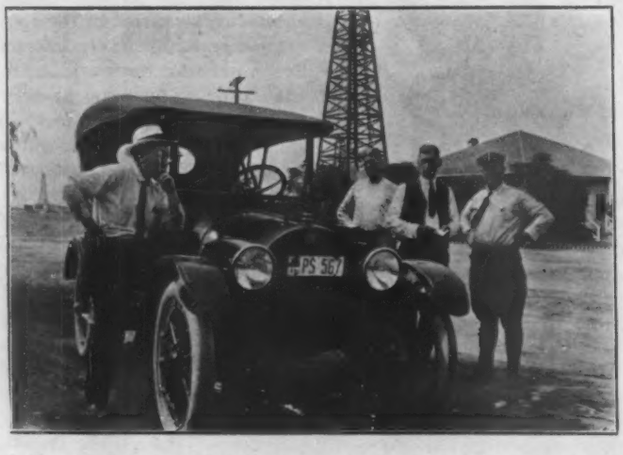
R. P. Teele of the U. S. Department of Irrigation and Drainage investigations, has been in Oregon recently inspecting the North Unit and Suttles Lake Irrigation Districts. Within the past month his department has moved from Washington, D. C., and headquarters in the future will be at Berkeley, Cal., Samuel Fortier in charge.

C. H. Beal, petroleum technologist of the U. S. Bureau of Mines, who has been stationed in the Washington office for the past two years, has been transferred to the San Francisco station. He expects to leave in a few days for an extended trip through the mid-continent field, where he will make a study of methods used in that district for estimating the future production of oil wells.

M. J. Gavin, formerly chemist for the Shell Oil Company of California, with headquarters in Oilfields, Cal., has recently received an appointment as assistant refinery engineer in the U. S. Bureau of Mines. Mr. Gavin will have charge of the chemical laboratory at the San Francisco station. He is at present in the East visiting the laboratories of the Bureau at Washington, Pittsburgh and other Eastern points.

Mortimer Fleischhacker, vice-president of the Northwestern Electric Company, passed through Portland recently on his way to his home in San Francisco from Washington, D. C. Mr. Fleischhacker is a member of the national board of mediation appointed by the administration to handle labor troubles in the shipbuilding industry in the district around San Francisco bay, and his recent trip to Washington was in connection with the labor situation in that district.

L. A. Somers, manager industrial division, Westinghouse Electric & Manufacturing Company, of San Francisco; Supt. Card of the Standard Oil Company, and his assistant, and Octavius Walthall, field superintendent of the San Joaquin Light



& Power Company, have recently enjoyed a pleasant inspection of the oil fields at Lost Hills, California. These men of the industry are shown in the picture in the order named, from left to right.

Kay Ingersiev, electrical engineer for the Siam Electricity Company of Bankok, Siam, and wife, came all the way from the Orient to attend the final sessions of the Pacific Coast Section, N. E. L. A., at Del Monte. They expect to spend some time in visiting other Pacific Coast points.

J. M. Wadsworth, petroleum engineer of the U. S. Bureau of Mines, with headquarters at San Francisco, has returned from a two months trip to Washington and other Eastern cities, where he has been making fuel tests for the bureau. Mr. Wadsworth will spend a part of his time during the next few months working in co-operation with the Federal Fuel Administration, and will have supervision of the solution of technical questions arising in connection with the burning of fuel oils.

E. W. Wagy, petroleum technologist of the Bureau of Mines, with headquarters at San Francisco, spent the months of March and April in Colorado and the mid-continent fields, co-operating with state officials in making investigations of the conditions of the wells in the Boulder field in an effort to ascertain if the production of this field could be revived. He also visited the mid-continent fields with particular reference to the different methods used for drilling; and assisted in an advisory capacity in water problems of the Eldorado, Kansas, field.

C. L. Cory, professor of electrical engineering at the University of California, has returned to Washington, D. C., to resume his duties as assistant director in the division of power supply for the U. S. Government Explosive Plants, a position to which he was appointed by D. C. Jackling in March. A power supply for the great smokeless powder plant near Charlestown, West Virginia, is to be secured by interconnecting the Virginia Power Company, Appalachian Power Company, and possibly the Logan Power Company, thus also liberating smokeless coal for navy use.

M. L. Requa, Fuel Oil Administrator, still hopes to bring about an agreement on the fuel oil situation. The Navy Department wants to have a large portion of the oil produced put into storage for future use, or to secure an agreement from the oil industry to deliver in the future quantities as needed. Oil producers, according to Percy T. Morgan, vice-president of the General Petroleum Company, are willing to meet the Navy in the future delivery requirements in part, but doubt the practicability of doing so completely. The oil men say the petroleum production of California has dropped from 100,000,000 barrels annually to 90,000,000 barrels and that the only source of quick additional production is in the naval reserves.

Charles A. Coffin, chairman of the board of directors of the General Electric Company and head of the Franco-American Clearing House in New York, is the only officer of the Legion of Honor in America. This honor came as a complete surprise to Mr. Coffin during a recent dinner. The ex-assistant French War Secretary, Justin Godart, brought with him to this country a special commission from his government to bestow the cross of an officer of the Legion of Honor upon Mr. Coffin. This honor was conferred on Mr. Coffin for his work at the Franco-American Clearing House, which is now under the direction of the Red Cross, and for his efforts to develop a system of scholarships for Americans in French universities. Mr. Coffin succeeded Judge Robert S. Lovett as the head of the Committee of Co-operation appointed by the Red Cross to negotiate with independent war relief organizations. As head of the executive committee of the War Relief Clearing House he has been very much interested and active in war service.

OBITUARY

Frank E. Getts, general manager of the Electrical Engineers' Equipment Company of Chicago, Ill., died suddenly of heart failure in Los Angeles, May 9, 1918. Mr. Getts and his wife have both recently made many friends in the Southwest, while on their recent visit. His sudden passing comes as a great shock to men of the industry the nation over.

MEETING NOTICES FOR ELECTRICAL MEN

(The union of the various engineering societies for the purpose of common service is one of the features of the present situation. Annual meetings of the national societies are reported with springtime regularity. In the local groups, many interesting meeting have taken place, but the greatest energy has been put in the past two weeks into the Red Cross Drive.—The Editor.)

Joint Meeting Associated Engineering Societies of Seattle

A joint meeting of the engineering societies of Seattle was held Tuesday, May 21st, at the Chamber of Commerce Hall, Arctic Building, at 8 p. m. The program as furnished by the Seattle Section, American Institute of Electrical Engineers, consisted of a paper on "The Work of the Bureau of Standards" by E. R. Shepard, associate electrical engineer, Department of Commerce, Bureau of Standards.

So many members of the several societies in the association have been called into active service of the United States for the period of the war that it is considered difficult for any one society to secure the advantage of a reasonably large attendance at regular meetings. On this account the council of directors and officers of the constituent societies have decided to hold joint meetings for the consideration of programs which will be provided by the various societies in turn. In this way, the scientific and social value of all meetings will be greatly increased.

When desired by any constituent society, a few minutes will be devoted to the transaction of any business of immediate importance. The following societies are included: Pacific Northwest Society of Engineers, American Society of Civil Engineers, American Institute of Mining Engineers, American Institute of Electrical Engineers, American Chemical Society, and Washington Association of Engineers.

The Engineers' Club of San Francisco

The board of directors of the Engineers' Club have for some months been considering means of enlarging the usefulness and increasing the membership of the club with the special end in view of securing the interest and support of the young men of the profession upon whom the future success of the club will depend.

A special meeting was held at the club on May 28, 1918, to vote on sundry proposed amendments to the By-laws, which the directors recommend as necessary to accomplish these ends.

The San Francisco Electrical Development League

The meeting of the San Francisco Electrical Development League for May 15, 1918, was largely given over to an "echo program" of the Del Monte conventions, in which the helpful features of that great series of gatherings were rehearsed and fixed in mind for the work ahead during the coming year. Paul Carroll, formerly in charge of publicity for the San Francisco Chamber of Commerce, exhibited a beautiful series of views he recently collected on a tour of China and Chosen.

No meeting was held on May 22d, as so many of the league members were actively engaged in putting over the second Red Cross War Drive.

Jovian Electric League

At the meeting of the Jovian Electric League of Los Angeles, held May 22d, Edgar J. Rose, electrical engineer, gave a most interesting and thrilling demonstration of high tension and high frequency electricity. R. C. Hill, manager of the Empire Electric Company, acted as chairman of the day.

San Francisco Section, A. I. E. E.

At the meeting of the San Francisco Section, A. I. E. E., on Friday, May 24th, at the Engineers' Club, the following subjects were presented:

1. "War Flying from Engineering Standpoint," by Lieut. William S. Leffler, Reserve Aviator, U. S. Army Air Service.

2. "Electro Chemistry and the Power Industry," by J. W. Beckman.

This was the last meeting of the season.

Engineering Council

The Engineering Council is an organization of national technical societies of America, created to provide for consideration of matters of common concern to engineers, as well as those of public welfare in which the profession is interested, in order that united action may be made possible.

The work of the committees represented under this council may be given as follows:

Public Affairs Committee reports on matters of public policy and those relating to national, state and local governments other than engineering and scientific technical questions.

American Engineering Service has extensive classified lists of technically trained engineers in all parts of the country, from which thousands of names have already been furnished to the government and to others for military and civilian engagement; is prepared to supply names civil, mechanical, electrical, mining, metallurgical, automotive, aeronautical, chemical, refrigerating, heating and ventilating and other professional engineers and assistants.

War Committee of Technical Societies is officially connected with Naval Consulting Board and War Department; engaged upon examination of new inventions and similar work for the government.

Fuel Conservation Committee is connected with Bureau of Mines and Fuel Administrator, studying and advising on problems of fuel utilization, especially coal.

Patents Committee has been organized to investigate reforms in United States patent system and in use of experts in litigation wherein validity of patents or other technical matters are involved. It will co-operate with similar committees of National Research Council and other technical societies.

Military Aid Committee will care for matters of common concern to engineers in uniformed and civilian service of government in connection with the war, during both wartime and the period of reconstruction.

Water Conservation Committee has been created to deal broadly with questions concerning utilization and control of water in all parts of the country for municipal supply, power development, navigation, irrigation, sewage disposal, flood control and other purposes; to promote such consideration of water resources by congress and legislatures as will result in conservation rather than unintelligent appropriation to a narrow use at the expense of some more important use, also to encourage wise development.

Publicity Committee will aid the secretary in collecting information of interest to Engineering Council and in discovering and utilizing suitable means of publicity.

BUILDERS OF THE WEST—XXX

CHARLES MILLS GAYLEY

Born in Shanghai, China, a graduate of the University of Michigan, and for a quarter of a century noted on two continents as author and lecturer on "Great Books," Charles Mills Gayley, dean of the faculties at the University of California, is today rendering service to the nation to a degree that few have the privilege to attain. His former students by the hundreds are now upon the seas, in the trenches, and—eagle-like—masters of the air; and today, this eloquent voice, in behalf of the allied cause, is being heard in hamlet, village and metropolitan life of the West. To you, Charles Mills Gayley, this issue of the Journal of Electricity is dedicated. And with this dedication goes the loving hope that results may be attained in still further arousing our nation in a manner in full keeping with the wonderful firmness and sincerity of your plea.

The American Society of Mechanical Engineers

The spring meeting will be held this year at Worcester, Mass., June 4 to 7, with headquarters at the Hotel Bancroft. Professional sessions will be held both at the hotel and at the Worcester Polytechnic Institute, and will largely relate to questions with which engineers are now having to deal in connection with the war.

The annual meeting papers for the December, 1918, meeting should be in the hands of the secretary by September 20. Papers are solicited for this meeting, and for any of the meetings held by the 22 local sections in different cities throughout the country. Brief contributions of less formal character are also desired, containing notes of experience, results of investigations, accounts of new work, engineering data, discussion of society affairs, etc.

Alameda County Electrical Club

The Alameda County Electrical Club held its regular monthly meeting in the Commercial Club Rooms of the Hotel Oakland, Monday, May 20th.

The meeting was very well attended and both James MacLafferty and Rev. Price gave very interesting talks—the former having for his subject "German Propaganda," and the latter, "The Red Cross." Both talks were well applauded.

President George Drew wishes to announce that the meeting day has been changed from Thursday to Monday, and the next meeting will be held on June 17th.

Colonel Carty Receives Edison Medal

Dr. John J. Carty, colonel in the United States Army Signal Corps and chief engineer of the American Telephone & Telegraph Company, has been awarded the Edison medal in recognition of his services in developing the science and art of telephone engineering.

The medal was presented on Friday evening, May 17th, at the annual meeting of the American Institute of Electrical Engineers in the Engineering Societies Building in West 39th street, New York. Colonel Carty is the eighth American scientist to be honored in this way, the others being Elihu Thomson, Frank J. Sprague, George Westinghouse, William Stanley, Charles F. Brush, Alexander Graham Bell, and Nikola Tesla.

The Edison gold medal was founded in 1904 by the Edison Medal Association, an organization composed of old associates and friends of Thomas A. Edison. It is awarded annually by a committee of 24 members of the American Institute of Electrical Engineers, and was first awarded in 1909, the recipient being Elihu Thomson.

A GRAND "SYNERGISTIC" RALLY AHEAD

So enthusiastic proved the recent rally of the California Electrical Co-operative Campaign held in Los Angeles, as recounted at some length in the Journal of Electricity for April 1, 1918, that the advisory committee have set the evening of June 7, 1918, at 7 o'clock in the Commercial Club rooms in San Francisco, as an occasion for a similar gathering in northern California. S. M. Kennedy, general agent of the Southern California Edison Company, now famous as the inventor of the word "synergism" at the Los Angeles meeting, has been asked to journey northward for this occasion. John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, has been asked to act as toastmaster. Other noted speakers who have been asked for this enthusiastic meeting are Samuel Kahn, general manager of the Western States Gas & Electric Company and the newly elected president of the Pacific Section, N. E. L. A.; L. H. Newbert, manager of the commercial department, Pacific Gas & Electric Company and chairman of the advisory board; H. C. Reid, president of the California Association of Electrical Contractors and Dealers; Albert Elliot, secretary of the Pacific Division of the National Electric Supply Jobbers Association; and Max Thelen, president of the California Railroad Commission. The occasion is to be one long to be remembered. Put it down in your note book at once. The price is but $1.50 per plate. Don't fail to lend your presence to this one great event of the season.

The purpose of this meeting is to forward co-operative helpfulness among all branches of the industry. Urge all your engineering acquaintances, contractor-dealers, and electrical men of every walk of life to be present. No special invitation is necessary. Every one interested in any way in affairs electrical will be welcome.

WHERE THE MEN OF THE INDUSTRY MEET

(The place where you can find where and when the other man meets. Information as to changes in officers, or additions or corrections, should be addressed to the Service Editor, Journal of Electricity. It is hoped to keep this directory up to date, so that travelers in a strange town who wish to attend the meetings of allied groups may not be misdirected.—The Editor.)

A. I. E. E.—WESTERN SECTIONS

National Officers
President—E. W. Rice, Jr., Engineering Society Bldg., New York City.
Secretary—F. L. Hutchinson, Engineering Society Bldg., New York City.
Meetings—Monthly.

Los Angeles Section
Chairman — Don. D. Morgan, 621 Pacific Electric Bldg.
Secretary—A. W. Nye, University of Southern California, Los Angeles, Cal.
Meetings—Second Tuesday of each month.

Portland Section
Chairman—S. D. Searing, care Portland Railway, Light & Power Co., Electric Bldg., Portland, Ore.
Secretary—R. M. Boykin, care North Coast Power Co., 441 Pittock Block, Portland, Ore.
Meetings—Monthly.

Denver Section
Chairman — Norman Read, 828 Symes Bldg., Denver, Colo.
Secretary — Robt. B. Bonney, 603 Wyoming Bldg., Denver, Colo.
Meetings—Third Saturday of each month, from October to May, at the Denver Athletic Club. Dinner at 6:15 p. m., followed by regular meeting.

San Francisco Section—
Chairman—Lars R. Jorgensen, Chronicle Bldg., San Francisco.
Secretary—Allen G. Jones, Rialto Bldg., San Francisco.
Meetings — Fourth Friday each month—Engineers' Club, 7 p. m.
May 24th—"War Flying From an Engineering Standpoint," by Lieut. W. S. Leffler; "Electro Chemistry and the Power Industry," by J. W. Beckman.

Seattle Section
Chairman — John Harisberger, 4015—4th Ave., N. E., Seattle, Wash.
Secretary — Glen Dunbar, City Lighting Department, Seattle, Wash.
Meetings—Monthly on third Tuesday in Chamber of Commerce Assembly Room, 9th floor, Arctic Bldg.
May 21st—"The Work of the Bureau of Standards," by E. R. Shepard.

Spokane Section
Chairman—Charles A. Lund, W. 828 Providence, Spokane, Wash.
Secretary—J. E. E. Royer, W. 408 Cleveland, Spokane, Wash.
Meetings—Third Friday of each month.

Utah Section
Chairman—A. S. Peters, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah.
Secretary—H. T. Plumb, 183 U St., Salt Lake City, Utah.
Meetings—Third Wednesday of alternate months, 8 o'clock, Assembly Room of Commercial Club, Salt Lake.

Vancouver Section
Chairman—R. F. Hayward, Western Canada Power Co., Ltd., Vancouver, B. C.
Secretary—T. H. Crosby, Canadian Westinghouse Co., Vancouver, B. C.

A. I. E. E.—WESTERN BRANCHES

University of California Branch
Chairman — A. J. Swank, University of California, Berkeley, Cal.
Secretary—G. F. Teale, University of California, Berkeley, Cal.

University of Colorado Branch
President—Robt. Newman, 1071—11th St., Boulder, Colo.
Secretary—William N. Gittings, 2429—12th St., Boulder, Colo.
Meetings—First and third Thursdays of each month of the school year in the Engineering Building, University Campus.

Idaho University Branch
Chairman—V. Pearson, Moscow, Idaho.
Secretary — L. J. Corbett, University of Idaho, Moscow, Idaho.
Meetings—First Wednesday evening of each month from October to June.

Oregon Agricultural College Branch
Chairman—J. A. Hooper, Oregon Agr. College, Corvallis, Ore.
Secretary—L. Happold, Oregon Agr. College, Corvallis, Ore.

Stanford University Branch
Chairman—H. W. Lewis, Stanford University, Cal.
Secretary—A. L. Morgan, Stanford University, Cal.

Montana State College Branch
Chairman—Roy C. Flagen, Montana State College, Bozeman, Mont.
Secretary—J. A. Thaler, Montana State College, Bozeman, Mont.
Meetings—Third Friday of every month of the school year in the Electrical Bldg.

Colorado State Agricultural College
Chairman—R. C. Richards.
Secretary—W. A. Stallings, Colorado State Agricultural College, Fort Collins, Colo.

Throop College of Technology Branch
Chairman—J. Paul Youtz, Throop Dormitory, Pasadena, Cal.
Secretary—Clark E. Baker, Throop Dormitory, Pasadena, Cal.

State College of Washington Branch
Chairman — S. E. Stites, 301 Montgomery St., Pullman, Wash.
Secretary—E. W. Tollefson, Box 393, College Sta., Pullman, Wash.
Meetings—Bimonthly at Mechanics Art Bldg., Pullman, Wash.

CONTRACTOR-DEALER ASSOCIATIONS

National Association of Electrical Contractors and Dealers
Chairman—W. Creighton Peet.
Secretary—Harry C. Brown, 110 West 40th St., New York.
Executive Committeeman-at-Large — W. D. Kohlwey, California; Executive Committeeman—S. C. Jaggar, Portland.

British Columbia Ass'n Electrical Contractors and Dealers
President—C. H. E. Williams, 509 Richards St., Vancouver, B. C.
Secretary—R. B. W. Pirie, 406 Yorkshire Bldg., Vancouver, B. C.
Meetings—First Tuesday of each month.

California Ass'n of Electrical Contractors and Dealers
President—H. C. Reid, 507 Montgomery St., San Francisco.
Secretary—J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Monthly.

Electrical Contractors and Dealers Ass'n of San Francisco
President—J. M. Carlson, 175 Jessie St., San Francisco.
Secretary—J. W. Asher, 601 Howard St., San Francisco.
Meetings—Saturday, 12:15; The States. Cafe.

Southern California Electrical Contractors and Dealers
President—G. E. Arbogast, 724 So. Olive St., Los Angeles, Cal.
Secretary—J. E. Wilson, 425 Consolidated Realty Bldg., Los Angeles, Cal.
Meetings—Every Friday at 6:30 p. m. at the Pin Ton Cafe, 427 South Broadway.

Monterey Bay Electrical Contractors and Dealers
President—W. Cox, Santa Cruz.
Secretary—J. A. Noggle, Monterey.

Nevada Ass'n of Electrical Contractors and Dealers
President—F. V. McAvoy, 138 N. Center St., Reno.
Secretary—R. W. Shearer, 215 Sierra St., Reno.
Meetings—Twice a month, 15th and 30th.

Oregon Ass'n of Electrical Contractors and Dealers
President — A. S. Halls, 262 Stark St., Portland.
Secretary—J. Willis Oberender, 301-2 Dekum Bldg., Portland, Ore.
Meetings—Every Saturday, 1:30 p. m.—Secretary's office.

Portland Local Ass'n of Electrical Contractors and Dealers
President—J. H. Sroufe, Jaggar-Sroufe Co., Portland.
Treasurer — J. W. Oberender, 301 Dekum Bldg., Portland.
Meetings—Saturday, 3 p.m., at 301 Dekum Bldg.

Utah Society of Electrical Contractors and Dealers
President—J. V. Buckle, Buckle Electrical Co., 70 E. 1st St., Salt Lake City.
Secretary—E. H. Eardley, Eardley Bros. Co., 37 E. 1st St., Salt Lake City.
Meetings — Every Friday noon at Commercial Club.

Washington Ass'n of Electrical Contractors and Dealers
President — V. S. McKenny, NePage & McKenny Co., Armour Bldg., Seattle, Wash.
Secretary — H. D. Alleson, 404 Oriental Bldg., Seattle, Wash.
Meetings — Quarterly—second Thursdays of March, June, September and December.

JOBBERS' ASSOCIATIONS

Electrical Supply Jobbers Association
General Secretary — Franklin Overbagh, 411 So. Clinton St., Chicago, Ill.
Meetings—Semi-annual.

Pacific Coast Electrical Supply Jobbers
President—W. S. Berry, Western Electric Company, San Francisco.
Secretary — Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Quarterly.

Electrical Credit Ass'n of the Pacific Coast
President—C. L. Gilson, Gilson Electrical Supply Co., 304—12th St., Oakland, Cal.
Secretary — Albert H. Elliot, 544 Market St., San Francisco.
Meetings—Annually: San Francisco; May.

OF ELECTRICAL INTEREST

Nevada Section, N. E. L. A.
Chairman—Geo. A. Campbell, Reno, Nev.

National Electric Light Association
President—J. W. Lieb, N. Y. Edison Co., New York City.
Executive Secretary—T. C. Martin, 33 W. 39th St., New York City.
Meetings—June.

Pacific Coast Section, N. E. L. A.
President—H. F. Jackson, Holbrook Bldg., San Francisco.
Secretary—A. H. Halloran, Crossley Bldg., San Francisco.
Meetings—Annually, in April.

Portland Section, N. E. L. A.
Chairman—C. L. Wernicke, care Westinghouse Elec. & Mfg. Co., Portland, Ore.
Secretary — R. J. Davidson, care Pacific Power & Light Co., Portland, Ore.

Illuminating Engineering Society
Meetings—First Tuesday each month.
President—G. H. Stickney.
Secretary—Clarence L. Law.
Western representative—Romaine Myers, Bacon Bldg., Oakland.

New Mexico Electrical Association
President—M. R. Buchanan, Silver City, N. M.
Secretary—E. M. Haggerson, Silver City, N. M.
Meetings—Annually, in February.

Southwestern Electric and Gas Association
President—H. C. Morris.
Secretary — H. S. Cooper, 403 Slaughter Bldg., Dallas, Texas.

Northwest Electric Light and Power Ass'n
President—Guy W. Talbot, 1212 Spalding Bldg., Portland, Ore.
Secretary—Geo. L. Myers, 1212 Spalding Bldg., Portland, Ore.
Meetings—Convention held annually. Executive Committee, governing body of Association, meets upon call of its chairman.
Next convention will convene in Portland, September 11, 1918.

Los Angeles Jovian Electrical League
President—H. N. Sessions, San Fernando Bldg., Los Angeles.
Secretary—W. C. McWhinney, Southern California Edison Co.
Meetings — Every Wednesday, 12 m.
May 22d—"High Tension and High Frequency Electricity," by E. J. Rose.

San Francisco Electrical Development League
President—R. E. Fisher
Secretary — J. W. Redpath, Rialto Bldg., San Francisco.
Meetings—Every Wednesday, 12:10 p. m.; luncheon, Palace Hotel.

Electric Metermen's Association
President — J. E. Bridges, Westinghouse Electric & Manufacturing Company.
Secretary — A. E. Coney, Great Western Power Company, San Francisco.
Meetings—About every 50 days.

Alameda County Electrical Club
President—George Drew, Pacific States Electric Company, Oakland, Cal.
Secretary — George B. Furmiss, Pacific Gas & Electric Company, Oakland, Cal.

Synchronous Club
Secretary—C. A. Blair, Los Angeles.

Telephone and Telegraph Society of the Pacific Coast—San Francisco Section
President—L. S. Hamm, Pacific Tel. & Tel. Co., San Francisco.
Secretary—Chas. H. Dobson, 835 Howard St., San Francisco.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

National Officers
President—Charles T. Main, Engineering Society Bldg., New York City.
Secretary—Calvin W. Rice, Engineering Society Bldg., New York City.

San Francisco Section, A. S. M. E.
President—B. F. Raber, University of California, Berkeley.
Secretary—Chas. H. Delany, 445 Sutter St., San Francisco.
Meetings—Quarterly.
Thursday lunches have been arranged at the Engineers' Club, 57 Post St.

Los Angeles Section, A. S. M. E.
President—F. G. Pease, Mt. Wilson Solar Observatory, Pasadena, Cal.
Secretary—T. J. Royer, 200 Title Insurance Bldg., Los Angeles, Cal.
Meetings—Quarterly.

ENGINEERS' CLUBS

Oregon Society of Engineers
President — Orrin E. Stanley, Box 973, Portland, Ore.
Secretary—C. J. Hogue, Box 973, Portland, Ore.
Meetings—Annual: Feb. 4, 1918. Monthly: Third Thursday of each month.

The Engineers' Club of Seattle
President—J. F. Pinson, Seattle, Wash.
Secretary—E. J. Bartells, Northern Life Bldg., Seattle, Wash.
Meetings—Thursday noon at the club rooms at 410 Arctic Bldg. A buffet luncheon is served every day. A special welcome is extended to all engineers visiting the city.

Engineers' Club of San Francisco.
President — B. P. Legare, 58 Sutter St., San Francisco.
Secretary—J. R. Brownell, 525 Market St., San Francisco.
Annual meeting: October.
May 28th—Special meeting.

Idaho Society of Engineers
President — W. H. Gibson, Mountain Home, Idaho.
Secretary—Ira F. Shaffner, Boise.
Annual meeting: January.

Engineers' Club of Oakland
President—R. S. Chew, Oakland Chamber of Commerce, Oakland.

Engineers' Club of Sacramento
President — George S. Nickerson, 914 Forum Bldg., Sacramento.
Secretary—P. M. Noeboe, State Department of Engineering, Forum Bldg., Sacramento.

MISCELLANEOUS

American Ass'n for the Advancement of Science—Pacific Division
President—D. T. MacDougal, Director Desert Laboratory, Carnegie Institution, Tucson, Arizona.
Secretary (acting)—J. R. Douglas, 430 Library, University of California, Berkeley, Cal.
Meetings—Annual.

American Chemical Society—Oregon Section
Secretary—Norman C. Thorne.

Foreign Trade Club
President — W. H. Hammer, Monadnock Bldg.
Secretary — Wm. E. Hague, Monadnock Bldg.
Meetings—238 Merchants Exchange Bldg., San Francisco. Every Wednesday evening.
May 22d—"The Inter-relation of Banking and Foreign Trade," by W. D. Wittemore. "French Indo China," by F. H. M. Goode.

Pacific Coast Gas Association
President — John D. Kuster, care Pacific Gas & Electric Co., San Jose, Cal.
Secretary—Henry Bostwick, 445 Sutter St., San Francisco.
Meetings—Annual. Next convention—September, 1918, in Los Angeles.

Society for Promotion of Engineering Education
Secretary—F. L. Bishop, University of Pittsburg, Pittsburg, Pa.

HAPPENINGS IN THE INDUSTRY

Annual Meeting of the Society for Electrical Development, Inc.

The annual meeting of the Society for Electrical Development, Inc., was held on Tuesday, May 14th, at the offices of the society in New York. At the board of directors' meeting, which followed the annual meeting, with J. E. Montague presiding, it was decided to continue the work of the society for another year upon the present basis and to conduct a "Convenience Outlet" campaign as suggested by the general manager. An appropriation was made to carry on the campaign along national lines, similar to the "Wire Your Home" and "America's Electrical Christmas" campaigns.

Pacific States Electric New Representative of Fibre Conduit Co.

The Pacific States Electric Company have been appointed exclusive sales agents on the Pacific Coast for the Fibre Conduit Company of Orangeburg, N. J. The Fibre Conduit Company has heretofore been represented in this territory by Pierson, Roeding & Co., who recently discontinued their business as manufacturers' sales agents.

New Power Loads

The Eureka Sash & Door Company of Eureka, Cal., has increased its power installation by 50 per cent, securing energy from the Western States Gas & Electric Company. The Western States Company is also installing 40 horsepower additional for the Holmes-Eureka Lumber Co.

The Albany, Ore., division of the Oregon Power Company recently secured orders for 10 electric signs containing a total of 927 lamps, within a one week period.

The Western States Gas & Electric Company, Stockton division, is serving the Sperry Flour Mills with an additional 315 horsepower in motors, making a total power installation for this concern of 453 horsepower. The new power installation will operate at a high load factor and is particularly desirable business from the central station standpoint. The flour company is milling large quantities of flour for export to France.

The Hercules Powder Company has 2500 men engaged in constructing their new plant at Pinole, Cal.

Permits for two hundred new homes have been issued in Tacoma, Wash., since the first of the year. It is expected that permits for 1918 will reach 1000.

Personal Items

J. F. NePage of the electrical engineering and contracting firm of NePage-McKenny Company, Armour Building, Seattle, Wash., recently returned from a trip to California. He reports that the San Francisco office of the company has secured a contract for complete electrical installations in Albers Brothers' flouring mill at Oakland, contract amounting to $22,000. The company also has a contract for electrical wiring in the elevator being erected at St. John's, Oregon, by the Portland Dock Commission, amounting to about $41,000.

Will C. Caffray has recently been appointed Pacific Coast manager for the Hart Manufacturing Company, manufacturers of the Diamond H line of push buttons, switches, receptacles and remote control switches. Mr. Caffray will make his headquarters in Los Angeles and carry a complete stock there, but proposes to arrange so that Diamond H material can be obtained from distributors throughout the Pacific Coast district.

New Business

The Denver Gas & Electric Company completed its month's Hoover sweeper campaign on April 20th. The number of machines sold totaled 535 with a value of $31,489. This was an increase of 25 machines and $1593 over last fall's campaign. Secretary Clare N. Stannard in wiring the news to New York, stated that he had received a congratulatory wire from the Hoover company, praising the Denver company as the leader in the sale of Hoover products.

Baker-Joslyn Company, 526 First avenue South, Seattle, has procured a contract from the city for supplying weatherproof and bare copper wire to the extent of $13,000. Delivery is to be made in five weeks and this was an element favoring the successful bidder.

Liberty Loan Returns

San Joaquin county, Cal., in which the Stockton division of the Western States Gas & Electric Company operates, oversubscribed its quota to the Third Liberty Loan 50 per cent.

Richmond, Cal., doubly subscribed its quota for the Third Liberty Loan, the total running over $500,000.

Every employee of the Sprague Electric Works of General Electric Company, on May 1, 1918 (1482 men and women) subscribed to the Third Liberty Loan. Their subscriptions aggregated the sum of $116,850, or an average subscription of $78.85 from each employee.

"Coal Week" from June 3 to 8

"Coal week," the period from June 3 to 8, has been selected by United States Fuel Administrator Garfield for an intensive and specific drive on the early ordering of coal. The fuel organizations of the various states, the county chairmen of fuel committees throughout the nation, coal dealers, chambers of commerce, mine operators, and others are all called upon to do their utmost to make this week's drive a big success.

Decision Deferred Until After War

The decision in the case of Marconi Wireless Company of America against Kilbourne & Clark Manufacturing Company of Seattle, extensively engaged in the production of wireless apparatus, has been postponed until after the war. The Kilbourne & Clark Company was given a verdict by the United States District Court and the case is now pending in the United States Circuit Court of Appeals. Decision by this court has been postponed at the request of the United States Navy Department. Stipulation that no further action be taken for the present, lest the government's claims be prejudiced, has been signed by counsel for contending interests.

University Organizes Course in Radio Communication

In response to a request from the Signal Corps of the United States Army, the University of California will offer a course in radio communication, beginning May 20, 1918, and extending over a period of from 12 to 15 weeks. The course will be open to students who have had courses in radio telegraphy, electrical or other engineering, or certain courses in physics. Application for admission should be submitted as soon as possible.

Limitation of the Importation of Crude Rubber

As one of the most important steps in its plan for conserving tonnage through the restriction of imports, the War Trade Board, at its meeting on May 7, 1918, directed its bureau of imports to limit the issuance of licenses for the importation of crude rubber from overseas to a total of 25,000 tons from May 6, 1918, to and including July 31, 1918. This restriction will be put into effect immediately by the bureau of imports. The requirements for the production of goods for the United States and allied governments will be met in full. The remainder of the 25,000 tons to be licensed will be allocated among the manufacturers of rubber products on the basis of their consumption during the calendar year of 1917.

All outstanding licenses for the importation of rubber from overseas will be void for ocean shipment as to shipments made from abroad after May 8, 1918.

LATEST IN EVERYTHING ELECTRICAL

(The construction of wooden ships has come to be one of the record achievements of the West. In this connection many new devices and improved methods have been brought forward—none of more importance than the electric dubber described here, which saves the time of many men—and, like most electrical machines, does the work more accurately. An interesting group of other new devices is further described. —The Editor.)

SPEEDING WOODEN SHIP CONSTRUCTION

As the demand for ships becomes more emphatic, new devices are being added to speed their production. This is particularly true in the Pacific Northwest, where the output of tonnage is large and steadily growing from month to month. Wooden ships in steadily increasing numbers are being turned out by the yards aside from the steel ship output, which is breaking all records.

The electric dubber

An important contribution to the wooden shipbuilding industry is an electric dubber perfected and manufactured by Gray & Barash, electrical engineers and machinists of Seattle. It is claimed for this machine that it will do the work of twenty men with adzes and this result attained by one operator. The United States Shipping Board thinks so well of it that it has already installed it at the plant of the Peninsula Shipbuilding Company of Portland and has ordered another for the Sloan plant at Anacortes, both of which plants were taken over by the government. The mechanism can do 70 to 80 per cent of the dubbing of a wooden hull and the adz is required on the balance.

Dubbing means fairing the inside and outside of a wooden ship in frame. Before the planking can be placed on the exterior of the hull and the sealing on the inside of the hull, it is necessary to fair the frames so they will have even surfaces. It is otherwise impossible to make the frames so that their surfaces will jibe. The electric dubber planes off the interior and exterior sides of the frames so that a smooth and even surface is presented for the planking and sealing. The work up to now has been done wholly by hand with the adz, which gives a surface 75 per cent fair or even, but the electric dubber gives a surface 100 per cent even and, according to government experts, the process adds 10 per cent to the strength of the hull.

The electric dubber operates on two eight-pound rails, 150 feet of track being provided for it. Rails stand four feet apart and are attached to the frames by lag screws. Six hundred square feet of space is covered without changing the rails.

Adjusting it to the curves of the vessel's hull is but the work of a moment. The carriage runs on the rails, moving forward under pressure of the operator's hand. An eight-inch cutter head in which the knives or planes are set is run by an electric dynamo, the cutter head shaving off the differences in the surfaces of the frames. As a matter of fact it is a portable planer operated by electric energy. The motor utilized is six horsepower, light and of high speed and the record of its operations is the dubbing of 1000 to 1500 square feet in eight hours.

Many plants have placed orders for this mechanism and others have it in operation. Among the plants placing orders are the Granton Iron Works of Noank, Conn.; American Shipbuilding Company of Brunswick, Ga.; Benicia Shipbuilding Company of San Francisco; Grays Harbor Motorship Co. of Aberdeen, Wash.; the McEachern Shipbuilding Company of Portland, and the Meacham & Babcock Shipbuilding Company of Seattle, and others. At Seattle the Elliott Bay Shipbuilding Company and the McAteer Shipbuilding Company have the electric dubber in full operation in their yards. The Tacoma Shipbuilding Company has had one going for several months.

GRILL WITH ALUMINUM PANS

To meet the demand for a grill with rust-proof pans, Landers Frary & Clark have brought out their E986 four heat round grill. This is similar to their regular E984 round grill but has two aluminum pans in place of the regular nickel plated steel equipment. Being of solid seamless aluminum, these pans will withstand long boiling and soaking in water without damage and are desirable equipment for round grills. The pans may also be purchased separately.

The aluminum pans may also be purchased separately

BRASS SHADE HOLDER

Harvey Hubbell, Inc., have placed on the market a line of brass shade holders of the three-screw type for use with medium and mogul base weatherproof and porcelain sockets.

Shade holder

The attachment to the socket is accomplished by means of a clamp and screw arrangement which guarantees a firm grip.

The holders are given a bright dip and lacquered finish, making an attractive as well as useful device.

BATTERY CHARGING INSTALLATIONS FOR INDUSTRIAL TRUCKS

The C-H sectional battery charging equipment for electrical vehicles which has been installed in a number of public and private garages, has also been widely adapted during the past two years for charging batteries of industrial trucks. The accompanying illustrations show typical installations of this equipment. The smaller equipment is a standard six section panel recently installed in the plant of Johnson & Johnson at

New Brunswick, N. J. One of their electric trucks which is partially shown in the illustration, is being charged from the third section from the top. The larger equipment is twelve circuit board consisting of two standard six section panels. The left hand panel is of the same dimensions but is equipped with control equipment for the operation of a motor-generator set supplying direct current to the charging sections. These charging panels are built much like the present day efficient

Twelve section panel with motor-generator panel on left used to charge industrial trucks at Pier No. 49, North River, New York City, Southern Pacific Railroad.

sectional bookcase. Each section has a grid resistance mounted on the back of the slate and control switches, fuses and slider rheostat head on the front. Each section is a complete self-contained unit providing everything necessary for the proper charging and protection of the battery. A standard panel, like the one shown, will hold from one to six sections and where more than six sections are required two or more panels can be bolted together. The dimensions of the sections and panels are standardized, hence future space requirements can easily be figured. The back of each panel is provided with vertical bus bars which are furnished with copper lugs for making connection to the supply wires. Two lugs are also provided on each section to which the battery leads are connected.

Standard six section panel at plant of Johnson & Johnson, New Brunswick, N. J.

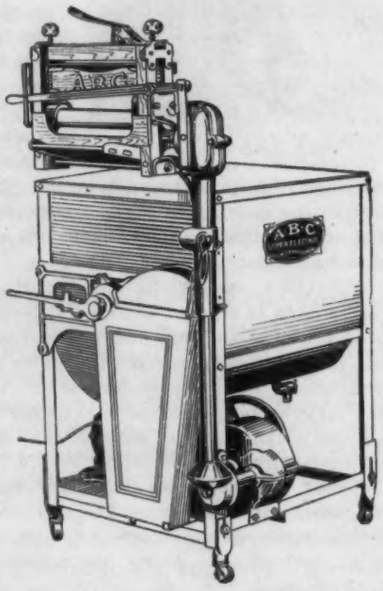
As alternating current is used throughout the plant of Johnson & Johnson, a motor-generator set, consisting of an alternating current motor and direct current generator, was installed to supply direct current for battery charging. The twelve circuit panel is installed on Pier No. 49 North River, New York City, owned by the Southern Pacific Railroad. This transportation company also owns and operates a number of steamships. At Pier No. 49 they now have a total of 21 industrial trucks in service. These trucks are used to carry material in and out of ships, working directly from boat to pier and thence to barges or conveyances nearby. The freight handled consists mostly of copper in pigs, molasses, resin and sugar in barrels, cotton in bales and other similar material. The trucks are also used as tractors to draw a number of trailers about the unloading pier. This company had but 12 trucks when the charging equipment was installed; since then they purchased additional trucks from time to time until now they have a total of 21. They are charged at night by filling the board to its capacity of 12 trucks and then replacing each truck as its battery comes up to full charge. In two years under this severe service, not one part of the charging boards has been replaced.

Both of the charging equipments described above were furnished by the Cutler-Hammer Mfg. Co., of Milwaukee and New York.

NEW A. B. C. ELECTRIC WASHER

A new washer of the revolving cylinder type has been developed by Altorfer Bros. Co., Peoria, Ill.

This washer, known as the A. B. C. Super-Electric, is made of metal throughout with the exception of the wringer frame and the revolving cylinder.



A revolving cylinder type washer

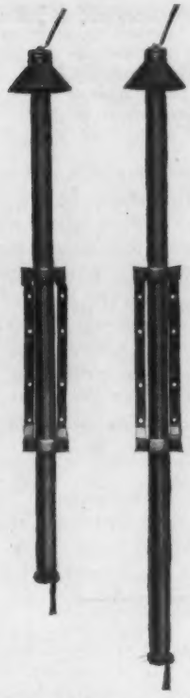
The cylinder is built of 2-inch wood staves spaced a quarter of an inch apart and perforated with half-inch holes, affording ample openings for the passage of the water through the clothes. A lid which locks tightly when the washer is in operation, is provided in the cylinder for inserting the clothes and removing them from the rotating cylinder. The cylinder makes a complete revolution in one direction and then reverses.

The wringer is supported by an upright arm extending from one corner of the washer. It is provided with a safety release which enables the operator to stop the rolls immediately if they get choked or overloaded, simply by pressing the lever on top of the wringer. The wringer will swing to any position and can be locked in any desired position.

The power is transmitted both to the wringer and washer by shaft drive. All gears are machine cut and run in oil. They are encased in metal shields. A ¼ horsepower Robbins & Myers splash-proof motor is used to drive the washer and is mounted on a cross piece between the leg braces.

A COMPRESSION CHAMBER ARRESTER FOR 10,000 AND 13,200 VOLT CIRCUITS

To protect pole transformers on 10,000 and 13,200 volt distributing lines, the General Electric Company has developed a unique form of compression chamber, multigap lightning arrester in which is embodied the shunt resistance principles (Fig. 1).



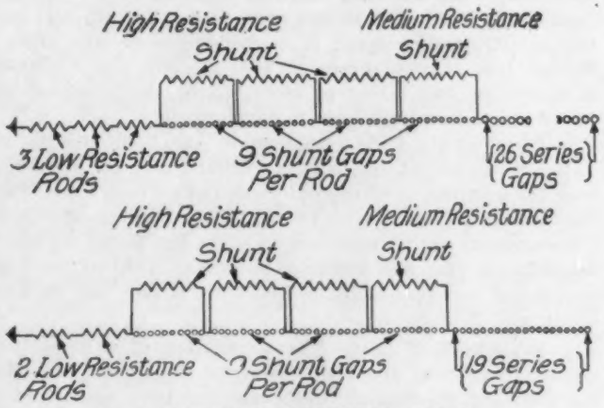
Compression Chamber Lightning Arrester for 6600, 11,000 and 13,200 volt service—Fig. 1

In the usual form of multigap shunt resistance arrester, the resistances shunt the gaps. In this form, the gaps shunt the resistances. The gaps are mounted on and insulated from the resistance rods. The arrangement of the gaps and resistances is shown in Fig. 2 and in Fig. 3.

Sensitiveness to lightning disturbances is obtained by this combination of gaps and resistance rods used as shunts, all mounted in a porcelain tube.

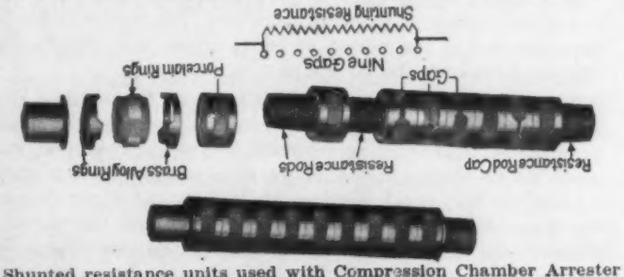
By reason of this combination of gaps and resistances, the arrester will discharge at low rises in potential, is sensitive to lightning over a wide range of frequency, and following the lightning discharge, quickly cuts off the generator current and prevents "grounds" or "shorts."

A number of paths for the lightning discharge through the arrester are offered by the four units of shunting resistance used. As the resistance rod in contact with the series gap is grounded through the other resistances, the initial discharge is made easy, because the ground potential is brought up to the bottom of the series gaps. The path which the discharge takes after passing through the series gaps depends on the frequency and quantity. Very high frequency will discharge straight across all the gaps. Discharges of lower frequency will take place through one of the shunt paths. The generator current which follows the lightning discharge will shunt to the resistance rods. This limits it to an amount that can be extinguished readily by the gaps.



LIGHTNING ARRESTERS—FIG. 2

For outdoor service of 7500-11,900 volts and 11,900 to 15,000 volts, respectively



Shunted resistance units used with Compression Chamber Arrester —Fig. 3

A NEW SAFETY SWITCH

The Square D Company, Detroit, Michigan, steel enclosed switch manufacturers, call attention to some of the very important features of their Square D safety switches, which are made under National Electrical Code specifications and are approved by the Underwriters' Laboratories, for both fire and accident prevention.

Square D safety switch

The switch is of very simple construction, completely enclosed in a sheet steel box so designed that ample wiring space is provided inside to make the necessary connections, and the corners of which are electrically welded, thus assuring great durability. The box is provided with a hinged cover, held closed with a simple spring, and the switch is operated by a crank handle located on the outside. Raised letters on the box indicate the "on" and "off" position of the switch.

The switch may be locked in the "off" position to prevent accidents while repairs are being made on apparatus controlled by it, provision being made for three individual padlocks. The advantages of these are obvious where there is more than one man working on the line or equipment. When each man starts to work he locks the switch in the "off" position. This eliminates the possibility of either man throwing the switch "on" before all are finished working. Means are also provided to seal or lock the cover shut to prevent unauthorized persons over-fusing the switch or tampering with live connections in any way, but the electrician has access to it at all times and can make his tests or inspection without stopping the motor or delaying production.

The electrician has access at all times

The switch is provided with a quick-break mechanism which is absolutely positive and insures a simultaneous break at all blades. This positive action makes longevity of the copper blades and the switch jaws a certainty.

Another feature is the interchangeability of end plates, which are furnished blank, with knock-outs, or with porcelain outlet covers for open wiring according to installation requirements.

NEW ELECTRICAL DEVELOPMENTS

(A city owned hydraulic plant is proposed for Walla Walla, and an ordinance for the issuance of four million dollars in bonds for the purchase of a power site has been introduced in Portland. The Northwest Electric Company is already building a $250,000 power plant in that city. At least one large hydro-electric project is planned in the Pacific Central District, and several improvements and extensions of transmission lines which are of importance.—The Editor.)

THE PACIFIC NORTHWEST

GOLD HILL, ORE.—The city has decided to equip the McClure power plant on Rogue River for municipal light and water uses.

NORTH VANCOUVER, B. C.—The city council is considering an option on the property of the Nairn Falls Power Company with a view of developing hydro-electric power.

PORTLAND, ORE.—The Northwestern Electric Company is to erect a $250,000 power plant at the foot of Lincoln street. Charles C. Moore & Company are engineers on the job.

EPHRATE, WASH.—The Ruff Lighting Company has asked for a franchise to construct, maintain and operate a transmission line for light and power over certain county roads.

PORTLAND, ORE.—An ordinance has been introduced to the city council providing for an issue of $4,000,000 for the purchase of a large tract of land as a site for a new power plant.

OLYMPIA, WASH.—Application has been filed with the state engineer by P. C. Kaylor for 9000 second feet of water from the Spokane River, to be used for hydro-electric development.

SEATTLE, WASH.—The Baring Granite Company, with offices in the Downs Building, Seattle, contemplates installation of a 200 horsepower hydro-electric plant at its plant near Baring, Wash.

KLAMATH FALLS, ORE.—The public service commission at Salem has rendered a decision that the Keno Power Company may secure a franchise and operate in the Klamath Falls countryy.

BELLINGHAM, WASH.—At a cost of several thousand dollars a power plant is to be erected by the Boundary Red Mountain Mine this summer to take the place of one destroyed by fire.

SEATTLE, WASH.—A bill granting a franchise to the National District Telegraph Company to install a signal alarm system in the city has been passed by the council over the veto of the mayor.

SEATTLE, WASH.—Equipment is being installed by the Coast Engine Company of Seattle for the manufacture of small electric lighting plants to be operated by heavy oil engines of 2½ horsepower.

EVERETT, WASH.—The city council has engaged Burns & McDonnell of Kansas City, Mo., to make investigations and prepare estimates of the cost of establishing a power plant in the upper Sultana River district.

SEATTLE, WASH.—The $30,000 concrete power station to be built by the Stone-Webster Company for the Puget Sound Traction, Light & Power Company is to be constructed at once at 6500 Fourteenth avenue S.

WHITE ROCK, B. C.—Arrangements have been made by the local water works company with the British Columbia Electric Railway, Power & Light Company to equip the local pumping station for electric operation.

EVERETT, WASH.—The United Steel Company, which is to install an electric furnace along with other equipment in its new plant, will also install two large magnets to be operated electrically for handing scrap.

WENATCHEE, WASH.—Application has been filed by the Chelan Falls Power Company with the county commissioners of Douglas county for the right to construct and operate electric transmission lines over certain sections of the county.

LAKEVIEW, ORE.—Contracts have been signed with the Goose Lake Valley Irrigation Company for water covering about 10,000 acres for the present season. Seven thousand acres are known as the Hunter lands, while the remainder are lands in private ownership scattered throughout the valley.

CLOVERDALE, B. C.—Contract was recently signed by officials of the Whitlock Waterworks, Ltd., with the B. C. and E. R. Company for extension of power and light transmission line to the waterworks pumping station. Plans are under way for transforming the plant from gasoline to electric motive power.

CHEHALIS, WASH.—The Valley Development Company of Portland, Ore., has applied to the state hydraulic engineer for a permit to divert the public waters of Lake Creek, tributary to Cowlitz River, in an amount of 105 second feet for the purpose of development of electric power for lighting cities for domestic purposes.

SALEM, ORE.—John R. Lewis, state engineer, has been advised that the Federal government has withdrawn several thousand acres of public lands suitable for water power developments from the Oregon-California Railroad grant acreage. About 100 townships are affected along the Nehalem, Umpqua, Siuslaw, Siletz, Rogue and Smith Rivers and their tributaries.

SALEM, ORE.—Articles showing a decrease in the capital stock of the Portland Railway, Light & Power Company from $40,000,000 to $35,000,000, were filed at the office of State Corporation Commissioner H. J. Schulderman. The stock is divided into 350,000 shares at $100 a share and represents $5,000,000 in first preferred stock, $5,000,000 in second preferred stock, and $25,000,000 in common stock.

PORTLAND, ORE.—Application has been filed by the Valley Development Company of Portland with the state engineer for a permit to divert waters of Lake Creek, Clear Fork, Johnson Creek, and Glacier Creek, for the purpose of generating electricity for transmission to cities and towns for manufacturing, mining and domestic purposes. The company has also asked for permission to construct a reservoir in Lake Creek and Clear Fork.

SPOKANE, WASH.—The installation of a flume, penstock, power plant and compressor for the Falls Creek Mining Company, on Pend d'Oreille lake has been authorized by W. C. Ames of Sandpoint, Idaho, president and general manager, according to Oscar Nordquist, mill contractor. The change in the plan of supplying power was made necessary by the expense of hauling gasoline. The flume will be a mile in length. The penstock will be 900 feet in length and provide a fall of 260 feet. The power plant will drive the mill and a compressor of four-drill capacity. The mill will not be operated during the period of construction and installation, but the tunnel will be advanced.

WALLA WALLA, WASH.—What may be the first step toward the city building and operating a hydro-electric plant to be used in connection with the city's water system was taken by the city commissioners at a recent meeting when a survey of Mill Creek between the intake and Tiger Canyon was ordered during the coming low water season. It was also ordered that a survey of the hillside on the south side of

the creek be made to ascertain the grade between the Tiger Canyon and the intake. The city commissioners feel that radical steps will have to be taken some time in the near future to supply the city with a better quality of water during the winter and early spring months when Mill Creek becomes exceedingly muddy.

PACIFIC CENTRAL DISTRICT

BERKELEY, CAL.—The city council is advertising for bids for a lighting system for certain streets and public buildings of the city.

GRIDLEY, CAL.—Rosenberg Bros. & Company have ordered an entire new power plant of 40 per cent more capacity for their rice mill here.

SALINAS, CAL.—The board of supervisors have given permission to the government to build a telephone line from Point Sur Lighthouse to Carmel-by-the-Sea.

SAN FRANCISCO, CAL.—The board of public works is receiving bids for furnishing the electric storage battery locomotives for use in connection with the aqueduct work of the mountain division.

OROVILLE, CAL.—Negotiations are under way between the Federal government and the Great Western Power Company of San Francisco for the construction of their hydroelectric plant to cost about $5,000,000.

CORNING, CAL.—E. J. Welch, representing the Northern California Power Company, has submitted a proposition to the trustees for a modern lighting system for the city. This was taken under consideration for future action.

WILLOWS, CAL.—An election was held in the Princeton-Codora-Glenn Irrigation District to decide the question of issuing and selling bonds in the sum of $175,000 with which to finance construction of the Princeton-Codora-Glenn Irrigation District.

OROVILLE, CAL. — During the past year the acreage contracting for water under the Western Canal has been more than doubled, according to Superintendent J. H. Hornung. This year over 14,000 acres will be irrigated by Western Canal waters.

SAN FRANCISCO, CAL. — Engineer E. V. Colby, 333 Grant avenue, is taking figures for a six-story class A building, to be erected for the Pacific Telephone & Telegraph Company on Franklin street, between Seventeenth and Eighteenth, Oakland.

SAN FRANCISCO, CAL.—Recommendation will be made by the supervisors' public utilities committee next Monday that the city co-operate with the Federal Government in building an extension of the Municipal Railway system to the end of the Hunters' Point boulevard.

REDLANDS, CAL.—A stock company will be formed for the manufacture on a large scale of the electrical appliances and linemen's tools invented by H. B. Bush, of this city, and which have been manufactured here and sold to the big electrical companies all over the country.

SAN FRANCISCO, CAL.—The Department of the Interior, Office of Indian Affairs, Washington, D. C., is asking for proposals for the installation of an electric lighting plant at the Southern Ute School, Colorado. Plans may be examined at the United States Indian Warehouse, San Francisco.

PORTERVILLE, CAL.—For the first time since its completion the Terra Bella irrigation district plant, built at a cost of more than $1,000,000, is serving water to members of the district association along all its main canals. Over 500 inches of water is being delivered to the users. In view of the ample supply of water, a number of large development projects will soon be under way in the Deer Creek district south of here.

STRATHMORE, CAL.—With the completion of the substation at Strathmore, the San Joaquin Light & Power Corporation will receive energy from the plants of the Mount Whitney Power Company and the Southern California Company. The companies affected by the tie-in at Strathmore are the Mount Whitney Power & Electric, the San Joaquin Light & Power, the Southern California Edison and the San Diego Consolidated Gas & Electric Companies.

REDDING, CAL.—The California-Oregon Power Company will build a high tension line from its southern terminus at Castella to Kennett at a cost of $330,000, and furnish power to the Mammoth mine and smelter for a minimum of $105,000 a year. The Northern California Power Company will reinforce its line from the Coleman power house to Hamilton at a cost of $110,000 and deliver power to Colusa for $240,000 a year to the Pacific Gas & Electric. Improvements to be made by the three companies will cost $3,000,000.

WOODLAND, CAL.—Arrangements have been completed between the Food Administration and the Yolo Lake and Power Company and the public interests of Lake county, whereby water from Clear Lake will be available for irrigating this season about 12,000 acres of rice land in Yolo county, which land, it is estimated, will yield a crop of approximately half a million sacks of rice. To complete the contemplated irrigation system it will be necessary to reduce the water of the lake three feet below its minimum level, that is to say, three feet below the zero point on the power company's Rumsey gage.

PITTSBURG, CAL.—Wealthy farmers of this section are developing plans for an irrigation system for this district that will take in the country as far west as Bay Point. Engineers have been making preliminary surveys and it is their opinion that the project is feasible and could be put in at such a cost that it would not be a burden on the land owners, and at the same time would assure them abundant crops yearly, whereas, under the present system of dry farming they only secure a crop every two or three years. The plan is to establish a pumping plant on the San Joaquin River, at what is known as Fuller's Point, and then bring the water to the edge of the foothills, where it would enter the proposed canals and carry it along to Bay Point.

MARICOPA, CAL.—W. H. Cooley, superintendent of the Side Hill Oil Company, has just completed the erection of a derrick for the drilling of the company's first well on the 80 acres of land recently purchased from the Midway Oil Company and located on section 34, 12-24. Work on setting up a thirty-five horsepower boiler has been started and is being rushed to completion for the purpose of furnishing power for the drilling of the well. A contract for electrical power has been entered into with the San Joaquin Light & Power Corporation to furnish electricity for drilling, as well as for the pumping of all wells to be drilled on the property. On account of the company lacking equipment at this time the extension of the lines to the Side Hill lease cannot be made at once and the steam boiler will be used until the electricity can be brought in.

THE PACIFIC SOUTHWEST

YUMA, ARIZ.—The Yuma Gas, Light & Power Company has begun work on the installation of a new transformer at its local substation.

SAN DIEGO, CAL.—A petition applying for the formation of a Public Highway Lighting District has been filed with the clerk of the board of supervisors.

PASADENA, CAL.—The city purchasing agent has been authorized to buy a gas engine for the light department, and electrical apparatus for the fire department.

LOS ANGELES, CAL.—The board of supervisors have granted the Economic Gas Company the right to lay gas pipes in certain public highways of Los Angeles county.

NOGALES, ARIZ.—The Arizona Gas & Electric Company has closed a contract for the wiring of the new Dumarert building on Morley avenue. The company will put in all wiring, install motors, etc.

LOS ANGELES, CAL.—Franchise for an electric distributing and transmission system has been awarded to the Southern California Edison Company for the sum of $4000 by the board of supervisors.

LOS ANGELES, CAL.—The board of supervisors have granted a franchise to the Midway Gas Company, giving them the right to lay and maintain gas pipes in certain public highways of Los Angeles county.

LOS ANGELES, CAL.—Plans are being considered by the city council for the installation of an electric lighting system in Fifty-fifth street, from Budlong to Normandie avenue. It is proposed to use marbelite standards.

SANTA FE, N. M.—The Andrews Telephone Company of Balinger, Texas, has written to the state corporation commission for permission to run a toll line into Eunice, N. M. The commission is to investigate the situation.

SANTA BARBARA, CAL.—A movement will be started in the near future to have ornamental lights installed on Anapamu street, from State street to Anacapa. The present poles and overhead wires will be removed and carried by a conduit.

PASADENA, CAL. — The city clerk is advertising for bids for one Edison storage battery complete with electrolite and to consist of 60 A-6 cells. The successful bidder will be required to take, in exchange, one 6-p A-6 cell Edison storage battery.

LOS ANGELES, CAL.—Bids are being received by the board of public service commissioners for 100 primary transformer fuse boxes or cut-outs suitable for at least 4400 volts, all to be of the same size and for the approximate range of from 5 to 60 amperes.

LOS ANGELES, CAL.—It is stated by William Mulholland, chief engineer of the water department, that four of the pumping plants are to be operated electrically. The plants to be changed to electrical power operation are the ones at Wilmington, Edendale and Garvanza.

ONTARIO, CAL.—Plans for the immediate erection of a new power house by the Ontario Power Company, at a cost of $60,000 have been endorsed at a meeting of stockholders of the San Antonio Water Company. The new plant will be located near Hog's Back in San Antonio canyon. It is hoped to have it ready for operation by January 1, 1919.

HOLLYWOOD, CAL.—The board of trade reports that the improvement of Franklin avenue will now be completed through an action of the city council granting permission to the Pacific Electric Railway Company to install T rails with concrete base, instead of girder rails, required by the city ordinance.

ONTARIO, CAL.—Plans for erection at once of a new power house by the Ontario Power Company at a cost of $60,000 have been endorsed at a meeting of stockholders of the San Antonio Water Company. The new plant will be located about Hog's Back in San Antonio canyon. It is hoped to have it ready for operation by January 1st next.

LOS ANGELES, CAL.—Plans for the construction of an electric railway line between Redondo Beach and Torrance, for connection with the shipbuilding plants at San Pedro, have been outlined by acting Mayor Cullen of Redondo. The proposed railroad will be single-track, perhaps four miles in length, and will cost in the neighborhood of $100,000.

SNOWFLAKE, ARIZ.—Contract has been awarded by the Snowflake and Taylor Irrigation Company for the installation of an electric light and power plant. As yet none of the equipment has been installed. The company contemplates beginning work on the construction of a hydro-electric plant about July 8. H. T. Lloyd of Wickenburg has the contract.

LOS ANGELES, CAL.—Notice of proposed sale of franchise for a street car line through the proposed Second street tunnel has been transmitted to the city council and referred to the public utilities committee for recommendation. The franchise will be for a street railway from First and Fremont streets, south on Fremont to Second street, and east on Second through the tunnel, to the junction of Broadway and Second street.

OCEANSIDE, CAL.—The work of establishing the San Diego Consolidated Gas & Electric Company in new quarters at Tremont and Third streets is going forward rapidly. Foundations for two 70-ton transformers have been completed and arrangements made for installation of large lightning arrester and other apparatus, so that when completed the plant will be capable of caring for the entire section adjoining Oceanside.

LAMANDA PARK, CAL. — An extension of tentative boundaries of a proposed county lighting district has been made by the lighting committee. A tentative boundary line now extends from Pasadena city limits on the west to the east on both north and south sides of Colorado street. A mass meeting will be held soon for the purpose of getting expression from the people on the question. Some property owners favor annexation by Pasadena and extension of the Pasadena lighting system, and others favor a system of ornamental lights instead of wooden poles that are proposed.

THE INTER-MOUNTAIN DISTRICT

MALTA, MONT.—The new electric lighting system will soon be placed in operation in Malta.

GREAT FALLS, MONT. — The Montana Electric Company has been granted a permit to erect a $10,000 brick warehouse.

ARCO, IDAHO—At an election held recently the proposal to issue $10,000 for the installation of an electric light and power plant was defeated.

GRANGEVILLE, IDAHO — Rice & Harness have purchased a lighting system for their ranch below Whitebird from W. S. Hunter. Ralph Mussel has purchased an outfit of the same make for his ranch.

WELLSVILLE, UTAH—Wellsville City Irrigation Company has been incorporated here with a capital stock of $4140, by Geo. Haslam, D. H. Maughan, W. J. Allen, R. A. Leishman, H. C. Parker, H. L. Maughan and F. O. Gunnell.

MILFORD, UTAH—Preparations are being made for development of the sulphur mine northeast of Milford, on the Beaver-Millard county line, and among other things Superintendent Diehl of the Beaver River Power Company expects to build a line to the mine.

SALT LAKE, UTAH—Preliminary work on plans for the new car barns for the Bamberger Electric Company is under way, according to an announcement made by Julian Bamberger, president of the company. It has not been decided as yet whether the new barns will be constructed in Salt Lake or Ogden, but the question will be settled before the plans for the barns are completed. Difficulty in getting equipment to replace the cars and motors that were destoyed by fire is being encountered, but the company is making efforts to secure new rolling stock to replace that which was destroyed.

SEATTLE SEEKS DEVELOPMENT OF SKAGIT RIVER POWER

The Seattle board of public works has rejected all bids for development of power sites and the city council decides to call for bids for a completed 35,000 kilowatt power plant on the Skagit river after plans have been drawn by the superintendent of lighting. It was also moved in council that corporation counsel prepare a resolution providing that the city council declares its intention to adopt the Skagit river site, and that such resolution, if adopted, be submitted to the government to guarantee the holding of the city's rights on the Skagit river until such time as bids may be received and acted on. Supplemental filings on this site have been made by the city. A $500,000 deduction has been made by the council from the estimated cost of the plant, thereby reducing it to the sum of $5,000,000, or the amount mentioned in the application to the capital issues committee of the Federal Reserve Board. The full capacity of the Skagit river project is estimated at 280,000 horsepower, the ultimate cost of which would be between $40,000,000 and $50,000,000.